



Ulyxe

USER'S MANUAL

PATENTS

This product is covered by one or more of the following patents.

U.S. patents: 7,480,318 B2

© 2008 – 2011 Datalogic Automation S.r.l. - ALL RIGHTS RESERVED - Protected to the fullest extent under U.S. and international laws. • Copying, or altering of this document is prohibited without express written consent from Datalogic Automation S.r.l.

Datalogic and the Datalogic logo are registered trademarks of Datalogic S.p.A. in many countries, including the U.S.A. and the E.U.

All other brand and product names mentioned herein are for identification purposes only and may be trademarks or registered trademarks of their respective owners

**Published 14 September 2012
Printed in Donnas (AO), Italy.**

SYMBOLS

SYMBOLS

The symbols used in this manual along with their meaning are shown below. The symbols are repeated within the chapters and/or sections and have the following meaning:



Generic warning:

This symbol indicates the need to read the manual carefully or the necessity of an important maneuver or maintenance operation.



Electricity Warning:

This symbol indicates dangerous voltage associated with the laser, or powerful enough to constitute an electrical risk. This symbol may also appear on the machine at the risk area.



Laser Warning:

This symbol indicates the danger of exposure to visible or invisible laser radiation. This symbol may also appear on the machine at the risk area.



Fire warning:

This symbol indicates the danger of a fire when processing flammable materials. Because there is a danger of fire, it is indispensable to follow the instructions provided by the manufacturer when commissioning the machine.



Note:

Refer to dedicated user's manual.

REVISION INDEX

Revision	Date	Number of added or edited pages
A	2008-04-17	Release
B	2009-02-19	Complete Revision for Ulyxe 2.0™
C	2009-09-30	Datalogic Automation format
D	2010-03-11	Standards References
E	2010-09-23	Environmental Declaration Windows® 7 compatibility
821001970	2011-09-07	General Review
821001971	2012-09-14	Appendix A

FOREWORD

FOREWORD

Information included in the following manual are indicated to a qualified installer able to integrate the equipment in a system, accomplishing with all the protection systems required from international rules and local legislations.

Following manual is referred to an Ulyxe™ system and its dedicated software Ulyxe Editor in Class 4 configuration.

Personnel assigned to operating the machine, in addition to being professionally trained for their specific job must read the manuals, pay careful attention to safety regulations and the sections pertinent to their job.

Individuals assigned to operating the machine are broken down as follows:

- **OPERATOR**

assigned to loading the elements to process, visual inspection of the work cycle, unloading of finished product and cleaning of the machine.

- **MAINTENANCE PERSONNEL**

assigned to electrical and mechanical maintenance of the machine.



NOTE:

Datalogic Automation S.r.l. shall not be held responsible for any non conforming use of equipment of its manufacture.



NOTE:

BEFORE INSTALLING AND USING THE LASER, READ CAREFULLY THE APPENDICES.

OVERVIEW

We are satisfied of your choice for a Datalogic Automation S.r.l. product and especially for an “ALL IN ONE” compact system made from experience years in laser marking field.

The marking system Ulyxe™ belongs to a Diode Pumped Solid State (DPSS) Q-switched side pumped laser category.

Its simple and compact design conveys a versatile, intuitive and easy product to integrate due to its advanced technology.

Easy to use, it can be the best investment to entry in the laser world without compromises about performance and to obtain excellent markings.

Ulyxe™ system includes all necessary to operate, a laser source DPSS Q-switched, a galvanometer scanning head, digital power controls, cooling system and monitoring functions. Entire unit and its mechanical base are covered by a high technology polyurethane plastic top.

The user can easily interacts and monitors laser status and its functions with an easy use of a LCD touch screen control display.

Ulyxe™ comprises all safety devices to prevent laser radiation leakage that could be potentially dangerous. **These devices actuation is demanded to the system integrator.**



NOTE:

Device installation in secure environment is responsibility of the system integrator!

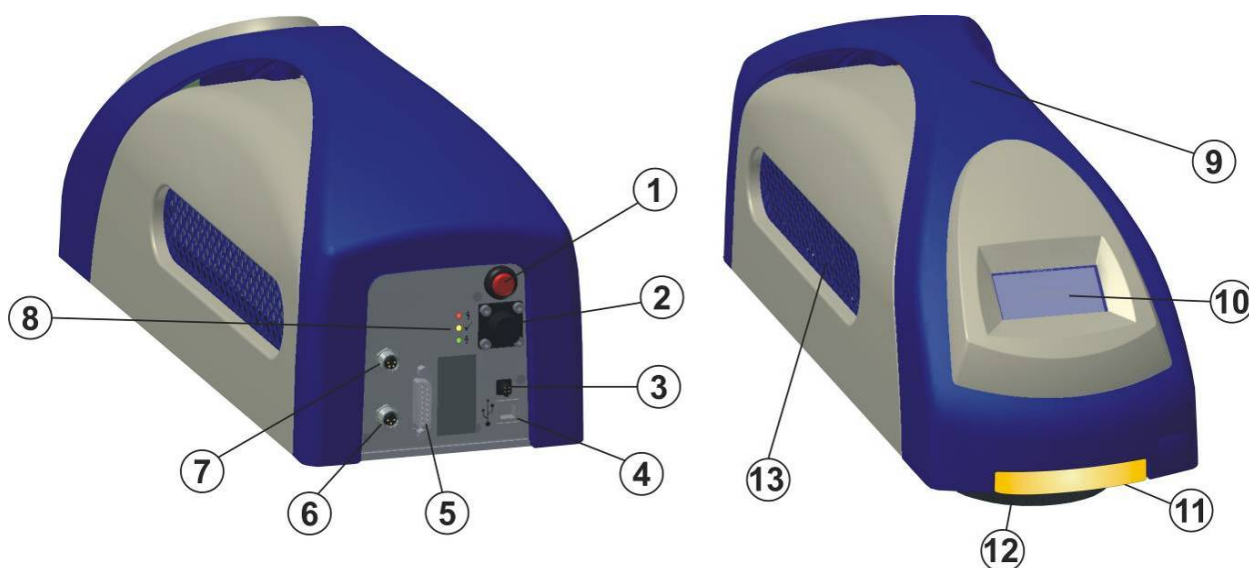


Figure 1: Overview Ulyxe™.

- 1 – Main-switch with led
- 2 – Power supply plug
- 3 – Aux Interlock plug
- 4 – USB plug
- 5 – Control Box plug
- 6 – RS232 plug
- 7 – CAN plug
- 8 – Led indicators

- 9 – Top Cover
- 10 – Touch screen LCD display
- 11 – System status led panel
- 12 – Focus lens
- 13 – Fan protection grid

OVERVIEW

IMPORTANT WARNING

Only authorized, qualified, fully-trained personnel and, in any case, only technicians who are fully skilled and aware of the risks inherent in the maintenance of electric, mechanical and optical components, may be allowed to access the internal parts of the electric sections and components of this machinery.

Datalogic Automation S.r.l. declines all responsibility and liability for maintenance and repair work carried out on live parts of this machine by technicians who have not been authorized or trained to perform such.



NOTE:

It's not allowed modify destination use of the system in different way of its functions.

Datalogic Automation S.r.l. declines any responsibility and liability for irregular and improper use of the machinery witch it manufactures.

USB 2.0 ADVICE

ULYXE™ exclusively works via USB 2.0 Full Speed only.

Certain hardware configurations and certain operative systems do not fully support the requested connection.

It is suggested to perform the following checks:

- Use only USB cables certified “HIGH SPEED” or quality “USB2.0” cable, not longer than 2 meters.



- Avoid using any kind of extension cable or any HUB on the cable path.
- Verify the compatibility of the operative system (see table below).
- Close all running programs and deactivate anti-viruses during installation.
- Some computers support only one USB2.0 at a time. On those systems, the use of other devices (USB memories, external HD, etc...) can disconnect the ULYXE™ peripheral devices (in particular it is observed that any USB 2.0 peripheral connected for last in temporal order isn't recognized from O.S.)
- There are some viruses that prevent the correct functioning of the USB devices (For example: W32.SMALL.R; W32.SMALL.S; WORM_SMALL.HYN, WIN32.SMALL.R; W32.SILLY-FDC, SILLYFDC-H, and others), It is suggested to use an updated anti-virus program.
- The computer must support USB 2.0 connection. In order to execute the check, verify the presence of the wording “USB2 EHC” or “USB2 Enhanced Host Controller” in the settings of the USB controller (START>CONTROL PANEL>SYSTEM select from hardware menu DEVICE MANAGER>CONTROLLER USB per WINDOWS® XP; START>CONTROL PANEL>SYSTEM>DEVICE MANAGER per WINDOWS® VISTA and WINDOWS® 7) like figure 2.

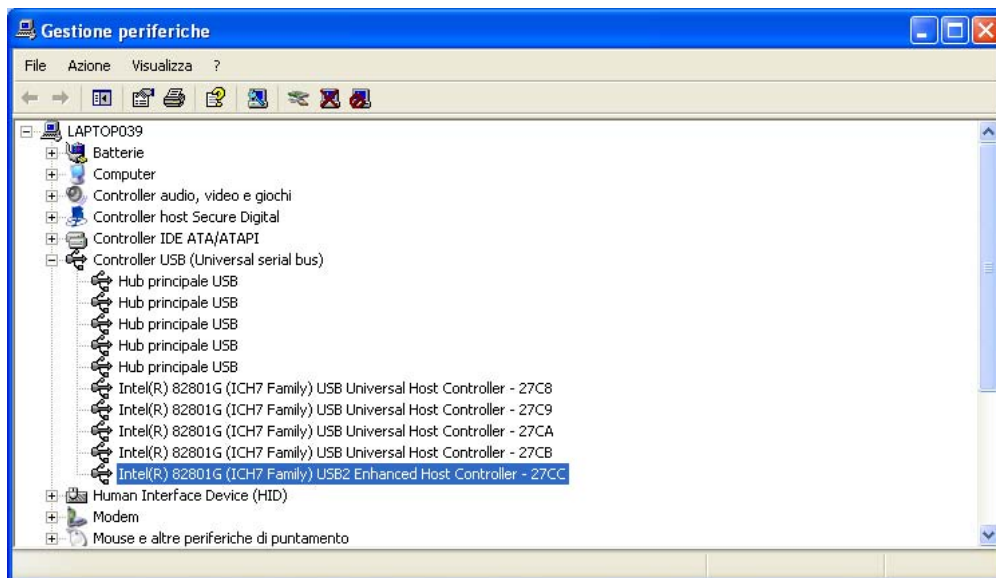


Figure 2: Device Manager controller USB.

USB 2.0 ADVICE

In some cases there could be conflicts with the marking software SMARTIST; it is suggested to remove it from the PC.

OPERATIVE SYSTEMS SUPPORTED

WINDOWS® XP PROFESSIONAL WITH SERVICE PACK 2
WINDOWS® VISTA
WINDOWS® 7

SUMMARY

SYMBOLS	II
REVISION INDEX	III
FOREWORD	IV
OVERVIEW	V
IMPORTANT WARNING	vi
USB 2.0 ADVICE	VII
SUMMARY	IX
1: TECHNICAL SPECIFICATIONS AND ACCESSORIES	11
1.1 TECHNICAL SPECIFICATION	11
1.2 SEALS	13
1.3 PACKING CONTENT	14
1.4 ACCESSORIES	15
1.4.1 BOXED POWER SUPPLY KIT	15
1.4.2 CONTROL BOX BASIC	17
1.4.3 CONTROL BOX EVO	18
1.4.4 FOCUS LENS	20
1.4.5 SUITCASE	20
1.4.6 HEAVY DUTY SUITCASE	21
1.4.7 FOCUS BEAM LASER DIODE	21
2: INSTALLATION AND SET UP	23
2.1 PREREQUISITES FOR INSTALLATION	23
2.2 ULYXE™ TRANSPORT	24
2.3 FIXING AND POSITIONING	24
2.4 INSTALLATION ENVIRONMENT	25
2.5 CONNECTIONS	26
2.5.1 PLUG-IN AUX INTERLOCK CONNECTOR	26
2.5.2 POWER SUPPLY CONNECTION	26
2.5.3 CABLING BOXED POWER SUPPLY KIT (OPTIONAL)	27
2.5.4 PLUG IN SIGNAL KEY CONNECTOR	27
2.5.5 CONTROL BOX BASIC CONNECTION (OPTIONAL)	28
2.5.6 CONTROL BOX EVO CONNECTION (OPTIONAL)	28
2.6 ULYXE EDITOR SOFTWARE INSTALLATION	29
2.7 MARKING AREA	34
2.7.1 PRINCIPLE OF OPERATION	34
2.7.2 COMPENSATION OF FIELD	37
2.8 EXAMPLE OF APPLICATIONS AND EXTERNAL CONNECTIONS	39
2.9 MATERIAL PROCESSING	41

SUMMARY

3: UTILIZATION AND OPERATIONS	43
3.1 STARTING PROCEDURE	43
3.2 EXTERNAL CONTROL SIGNAL	48
3.2.1 TIMINGS I/O	48
3.3 MAINTENANCE	49
4: TECHNICAL SPECIFICATIONS	51
4.1 ELECTRICAL UNIT	51
4.2 EXTERNAL CONNECTORS SPECIFICATIONS	54
4.2.1 POWER SUPPLY PLUG	54
4.2.2 POWER SUPPLY CONNECTOR	54
4.2.3 AUX INTERLOCK SOCKET (SW LEVEL)	55
4.2.4 AUX INTERLOCK CONNECTOR	55
4.2.5 SIGNAL KEY PANEL SOCKET (EXTERNAL SAFETIES AND STATUS SIGNALS)	56
4.2.6 SIGNAL KEY CONNECTOR (EXTERNAL SAFETIES AND STATUS SIGNALS)	57
4.2.7 RS232 CONNECTOR	57
4.2.8 CAN CONNECTOR	57
4.3 DISPLAY	58
4.4 TROUBLESHOOTING	62
4.4.1 LIST OF POSSIBLE MALFUNCTIONS	62
4.4.2 ERROR MESSAGES	64
APPENDIX A : LABELS IDENTIFICATION	67
EXTERNAL LABELS LOCATION	68
INTERNAL LABELS LOCATION	68
APPENDIX B: STANDARDS	69
LASER STANDARDS	69
CE COMPLIANCE	69
FCC COMPLIANCE	69
APPENDIX C: GUIDE FOR SYSTEM INTEGRATOR	70
APPENDIX D: NOTE ABOUT LASER	71
LASER SAFETY	71
LASER RADIATION	72
ABSORPTION OF LASER RADIATION	73
CLASSIFICATION AND DANGER LEVEL	73
RADIATION VIEWING CONDITIONS	74
DIRECT VIEWING OF THE LASER BEAM	74
DIRECT VIEWING OF THE BEAM AFTER MIRROR REFLECTION	74
DIRECT VIEWING OF THE BEAM OUTPUT BY AN OPTICAL FIBER	74
DIRECT VIEWING OF THE BEAM AFTER FOCUSING	74
SCATTERED VIEWING OF THE BEAM AFTER FOCUSING	74
REAL DNRO DETERMINATION AND O.D. OF PROTECTION GOGGLES	75
EYES AND SKIN RISKS	77
GENERAL SAFETY REGULATIONS	77
COLLATERAL RISKS	77
APPENDIX E: DECLARATION OF CONFORMITY	79
FIGURES	81

1 : TECHNICAL SPECIFICATIONS AND ACCESSORIES



NOTE:

BEFORE INSTALLING AND USING THE LASER, READ CAREFULLY THE APPENDIXES.

1.1 TECHNICAL SPECIFICATION

CABINET INFORMATION

Weight	7.8 Kg
Height	170.5 mm
Width	154 mm
Depth	426 mm
IP Grade	20

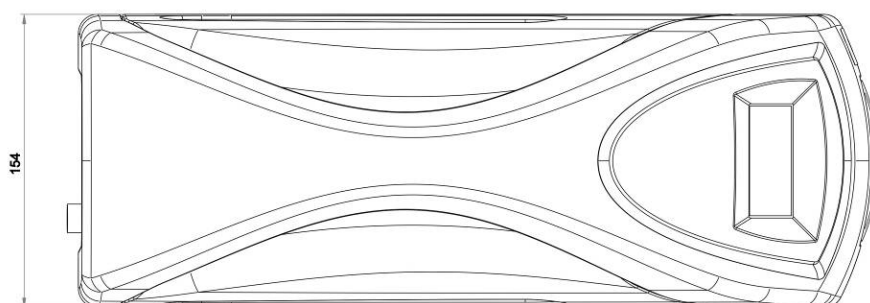
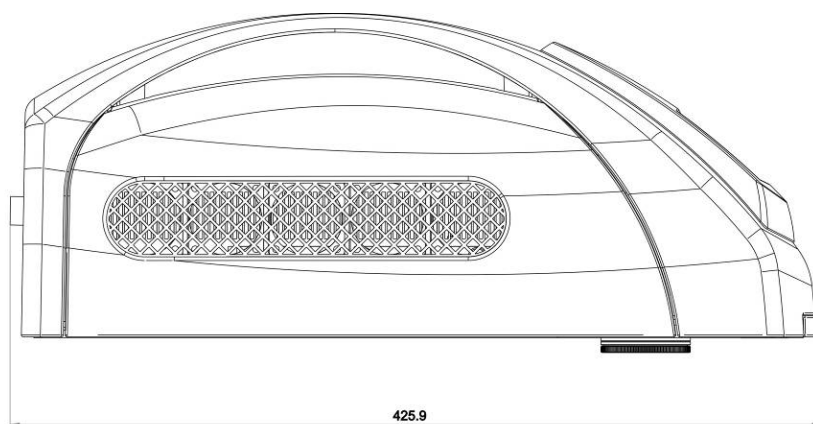
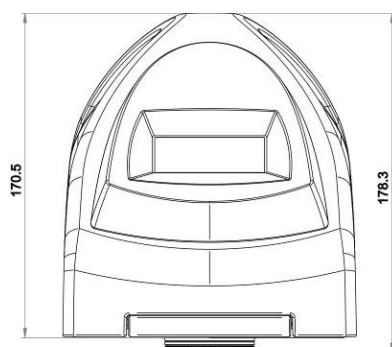


Figure 3: Ulyxe™ Overall dimensions.

CHAPTER 1

STORAGE

Storage temperature	Min. -5°C (23°F) / Max. +55°C (131°F)
Shock and vibrations	The components are not designed to withstand shocks and vibrations
Maximum sustainable acceleration	0,5 G

ENVIRONMENTAL CONDITIONS FOR OPERATION

Environmental temperature	Min. 15°C (59°F) / Max 35°C (95°F)
Humidity	< 90% without condensation
Altitude	< 1000 m
Suspended matter	< 3 mg/m ³
Vibrations	None

POWER SUPPLY

Input Voltage / Power	24V DC
Current Input	13 A

PERFORMANCE

MARKING LASER	
Laser class	Class 4
Power	6 W @ 50KHz
Laser source	DPSSL (Diode Pumped Solid State Laser)
Active Mean	Nd:YVO ₄
Wavelength	1064 nm
Modulation Frequency	15KHz ÷ 200KHz
Emission radiation	Pulsed
AIMING LASER/ OPTIONAL FOCUS LASER	
Laser class	Class 3R
Aiming beam	3 mW
Laser source	Solid State
Wavelength	635 nm
Cooling	Air
Noisiness	< 70 dB (A)

1.2 SEALS

Ulyxe™ device has seals in the below indicated areas:

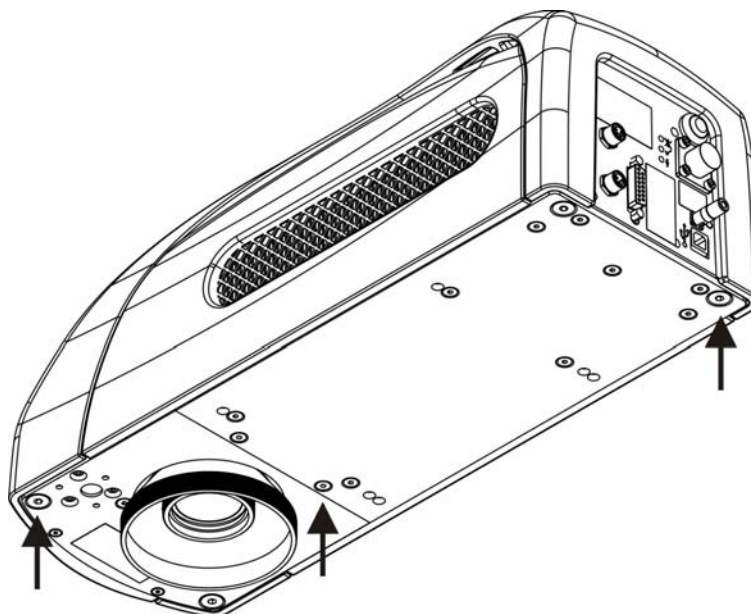


Figure 4: Seals position.

The engraving system has seals in some areas. The seals must not be broken or removed for any reason. The sealed parts may be opened only and exclusively by Datalogic Automation S.r.l. Breakage of these seals by a customer shall result in immediate cancellation of the warranty on the entire engraving system.



NOTE:

If a customer **breaks or removes the seals placed** by the manufacturer on the laser system **the warranty** on the entire laser system will immediately become **null and void**.



WARNING!

The manufacturer shall not be held liable for any **non conforming use** of equipment of its manufacture.

It is **forbidden** to operate the equipment before the machine it is intended for has been **declared in conformance** with statutory Directives.



NOTE:

Access to the internal parts of the electrical equipment is only permitted for **authorized personnel**, who have been trained and instructed on the electrical risks.

Datalogic Automation S.r.l. shall not be held liable for work on electrically charged parts by inadequately trained personnel!



NOTE:

Access to the internal parts of the resonator is only permitted for **authorized personnel**, who have been trained and instructed on the optical risks!

Datalogic Automation S.r.l. shall not be held liable for work on parts by inadequately trained personnel!

CHAPTER 1

1.3 PACKING CONTENT

MAIN HARDWARE

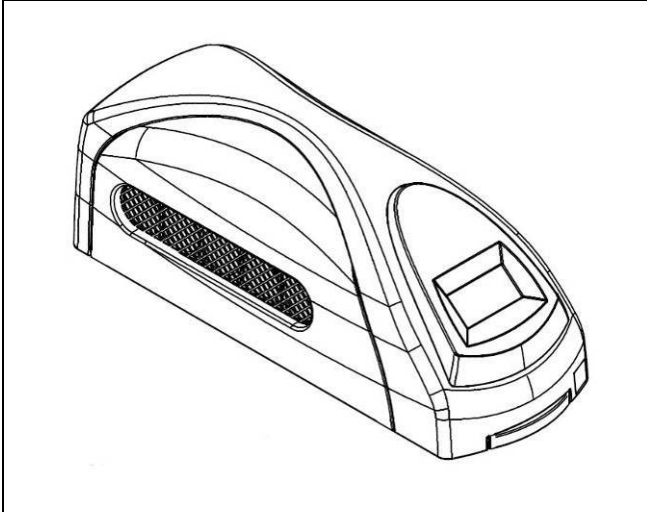


Figure 5: Ulyxe™.



Figure 6: Focusing Lens 160 mm.

CABLES



Figure 7: Power supply cable.

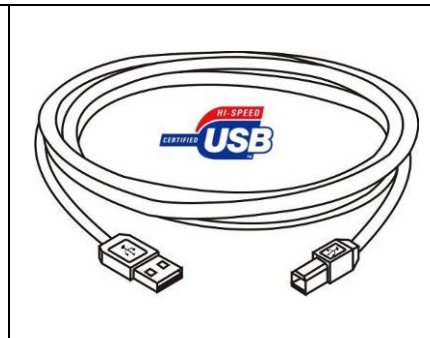


Figure 8: USB cable.

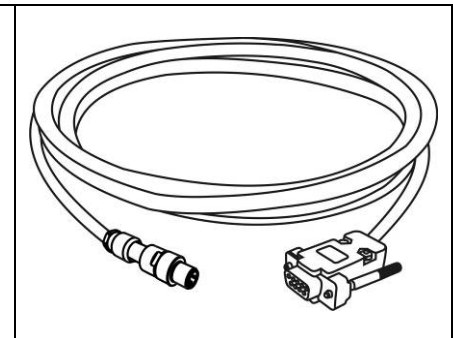


Figure 9: RS232 cable.

KEYS

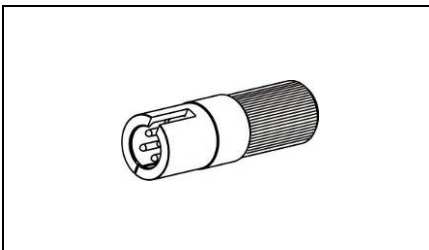


Figure 10: Aux Interlock.

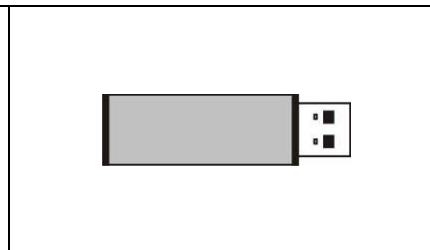


Figure 11: USB key.

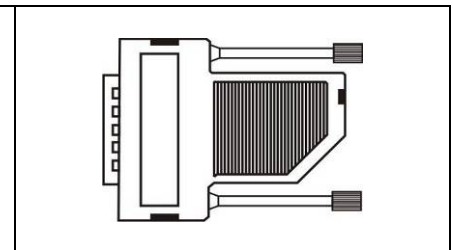


Figure 12: Signal Key.

1.4 ACCESSORIES

Following accessories are described only for information purpose and they are not intended in basic machine package. Minimal content packaging includes main hardware, cables and keys. For any further information consult paragraph 1.3.

1.4.1 BOXED POWER SUPPLY KIT

AC/DC stabilized power supply with front cover, power inlet plug, power on mains witch and cables.

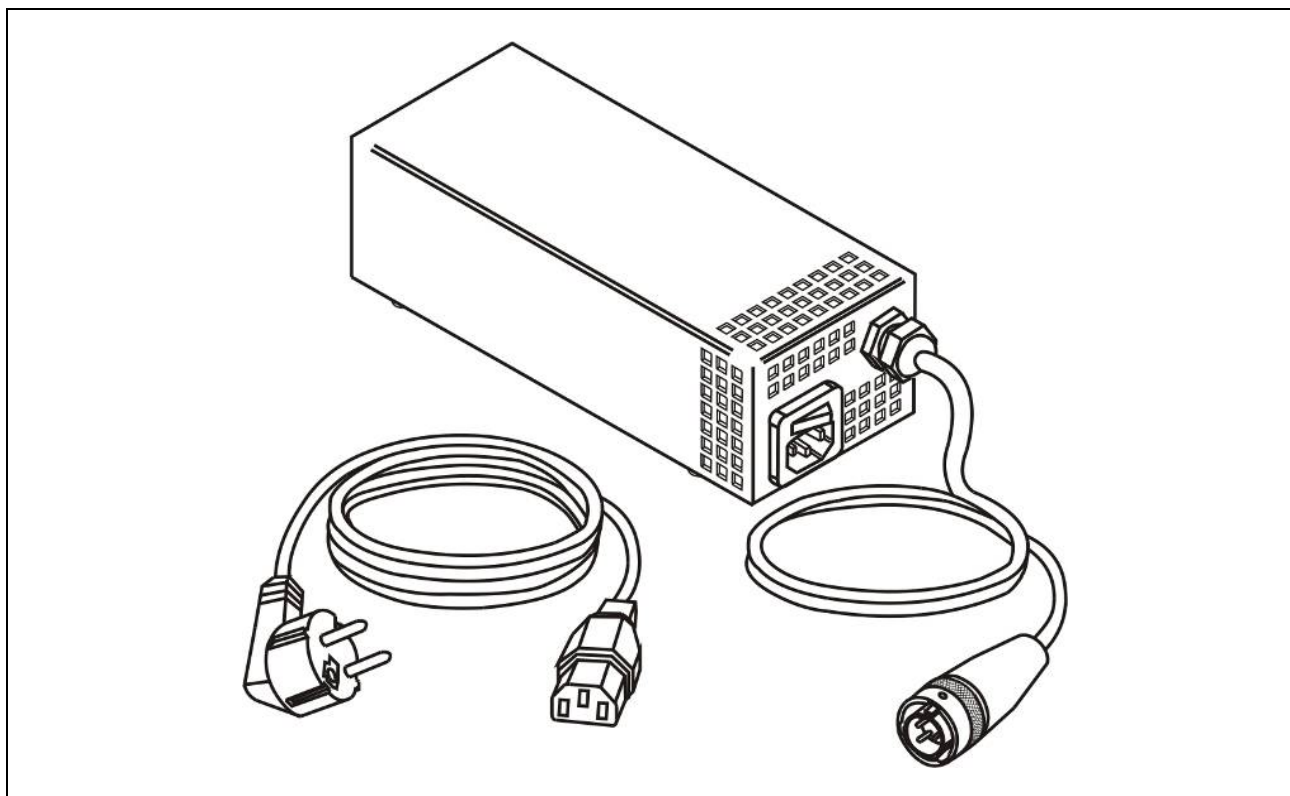


Figure 13: Power supply and cables.

CHAPTER 1

LAMBDA HWS300-24	
Output voltage	24V DC, 14A ($\approx 300W$), Ripple Noise 150mV
Input voltage	85-265 Vac (47-63Hz)
Size	61 x 82 x 165 mm
Withstand Voltage	Input to ground 2.5kVac, Input to Output 3kVac, Output to ground 500Vac
Isolation voltage	>100M Ω , Output to ground 500Vdc
Mark	CE Mark
EMI compliance	EN55011 / EN55022, FCC, VCCI Class B
Immunity compliance	IEC61000-4-2, -3, -4, -5, -6 (Level 3), -8 (Level 4), -11
Safety Agency Approvals	UL60950-1, CSA60950-1, EN60950-1, EN50178, UL508

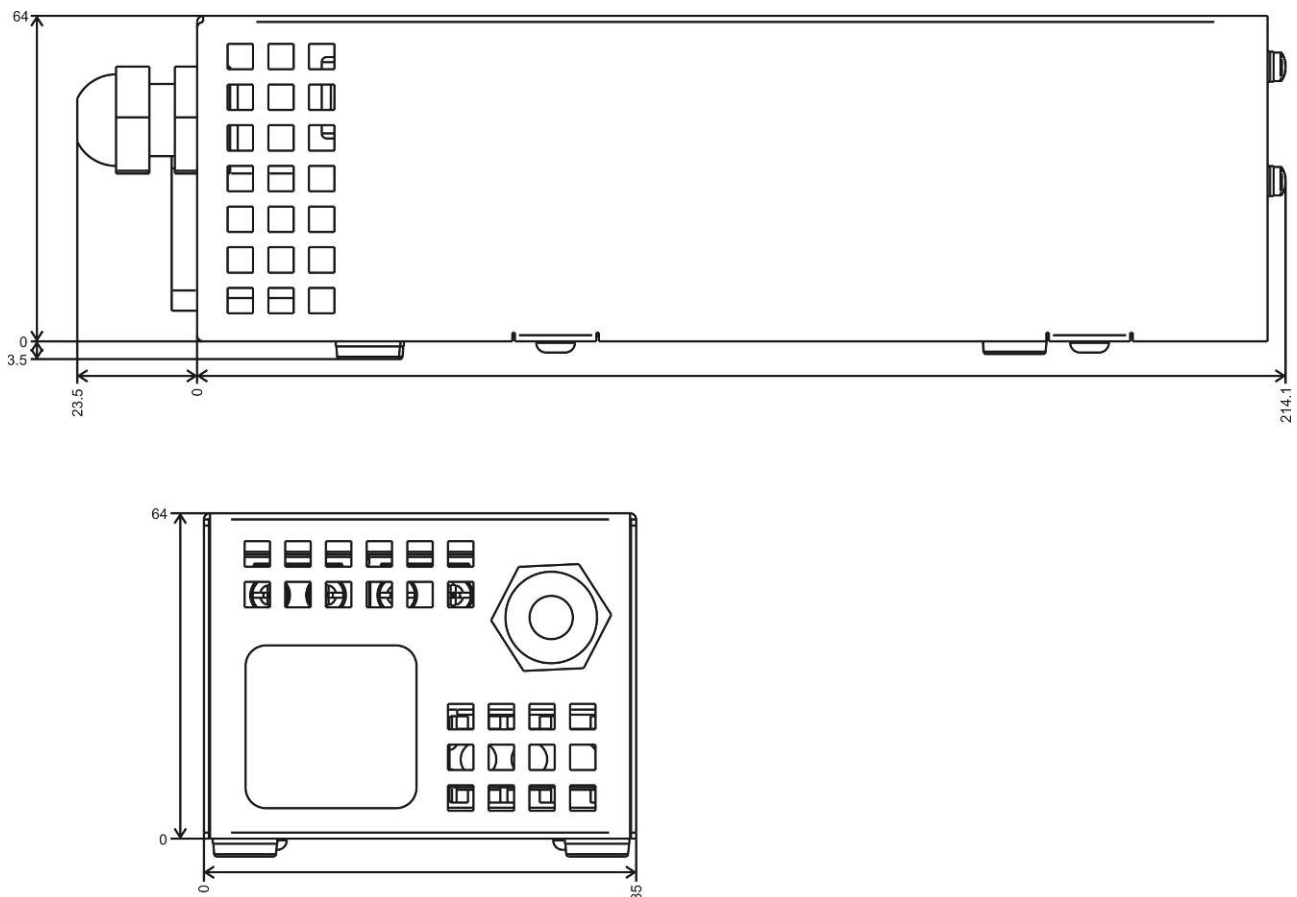


Figure 14: Power supply overall dimensions.

1.4.2 CONTROL BOX BASIC

Ulyxe™ control and command device to manage laser power on, to open shutter and laser enable, to start and stop marking and to show DSP status.

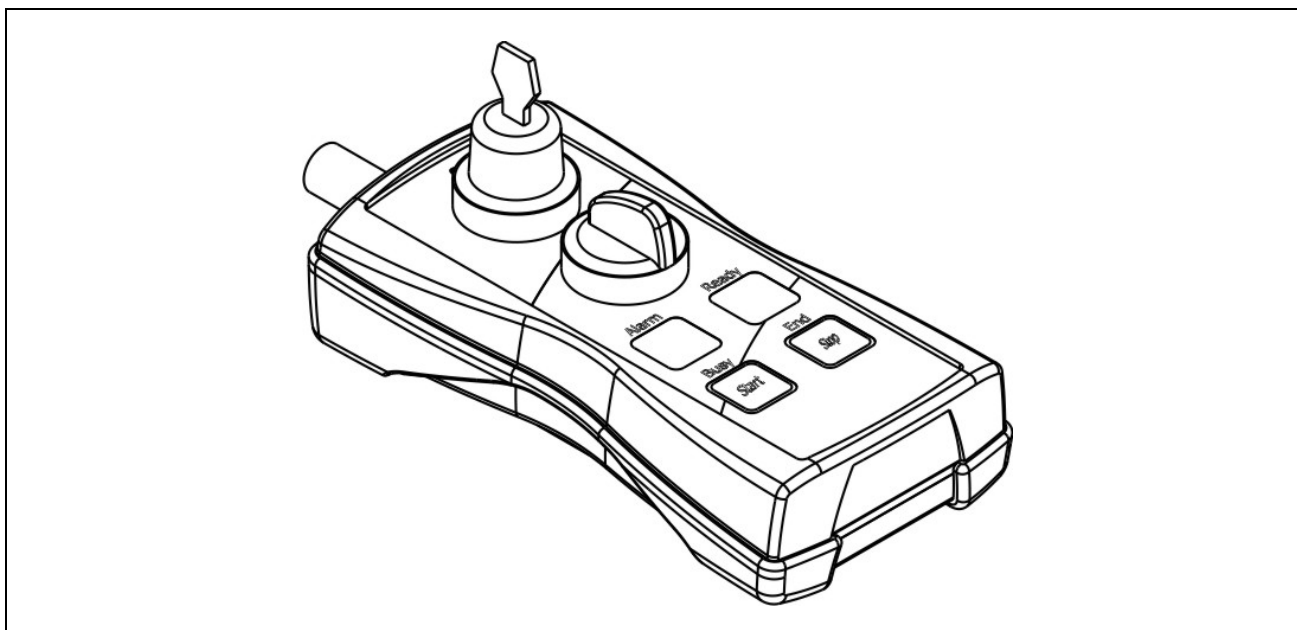


Figure 15: Control Box Basic.

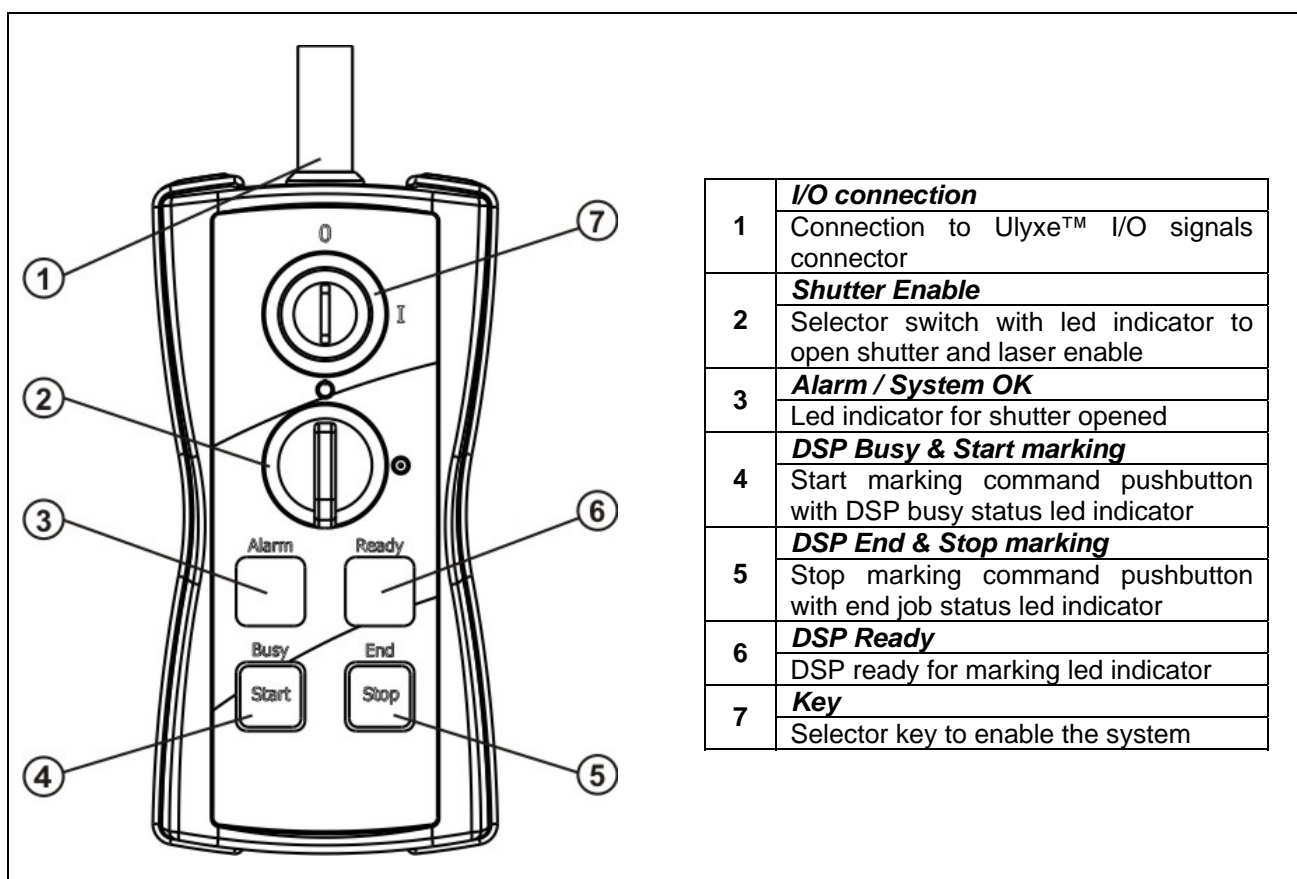


Figure 16: Control Box Basic.

CHAPTER 1

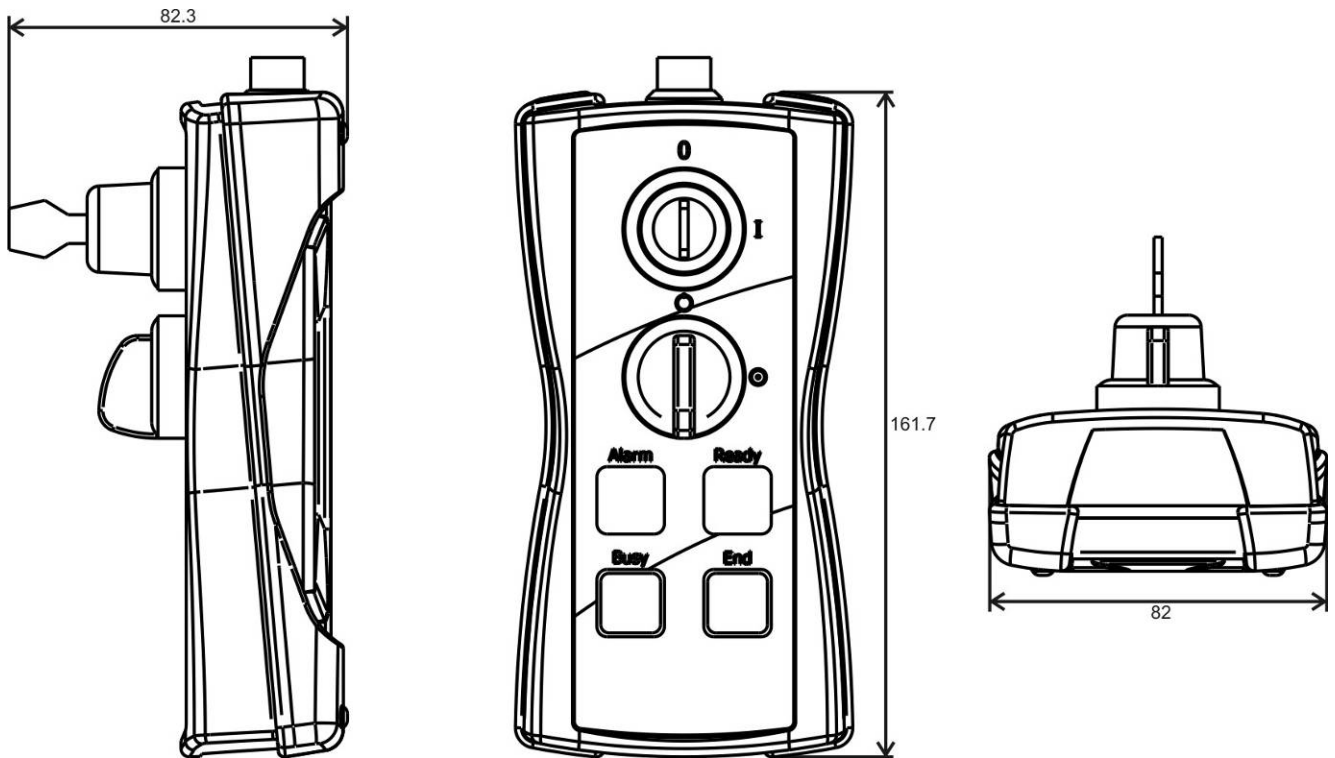


Figure 17: Control Box Basic overall dimensions.

1.4.3 CONTROL BOX EVO

Ulyxe™ control and command device to manage laser power on, to open shutter and laser enable, to start and stop marking and to show DSP status.

This device contains also remote LCD, with encoder pushbutton control, and allows to view laser parameters and to set up aiming and focusing laser beams like Ulyxe™ display onboard.

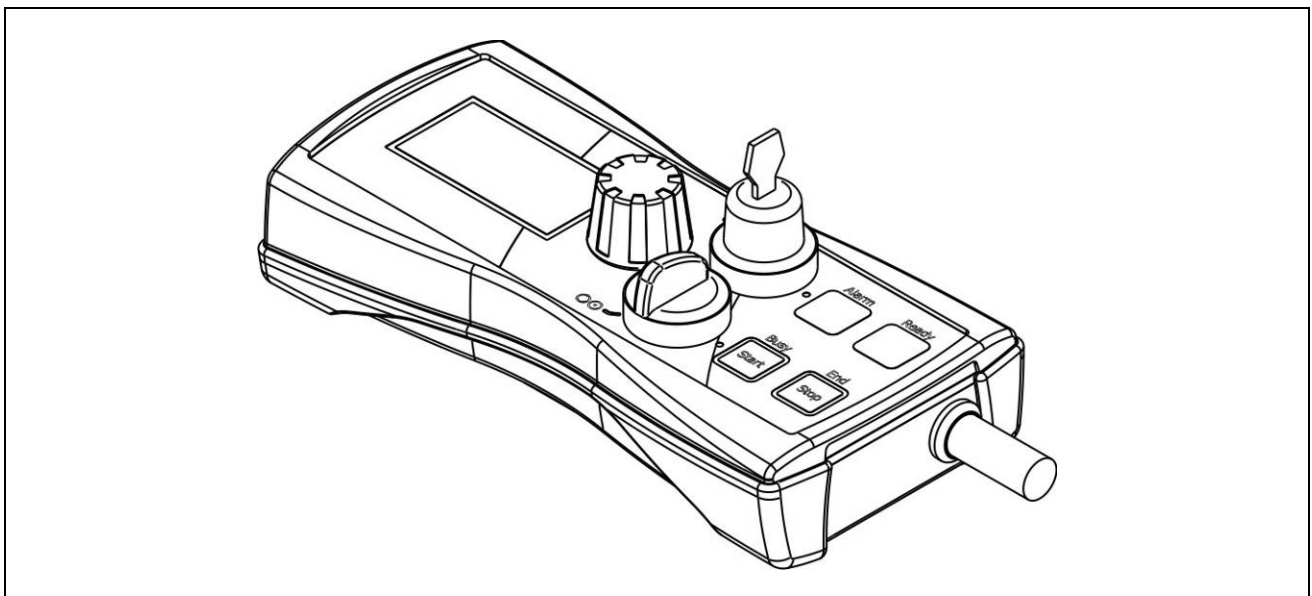


Figure 18: Control Box Evo.

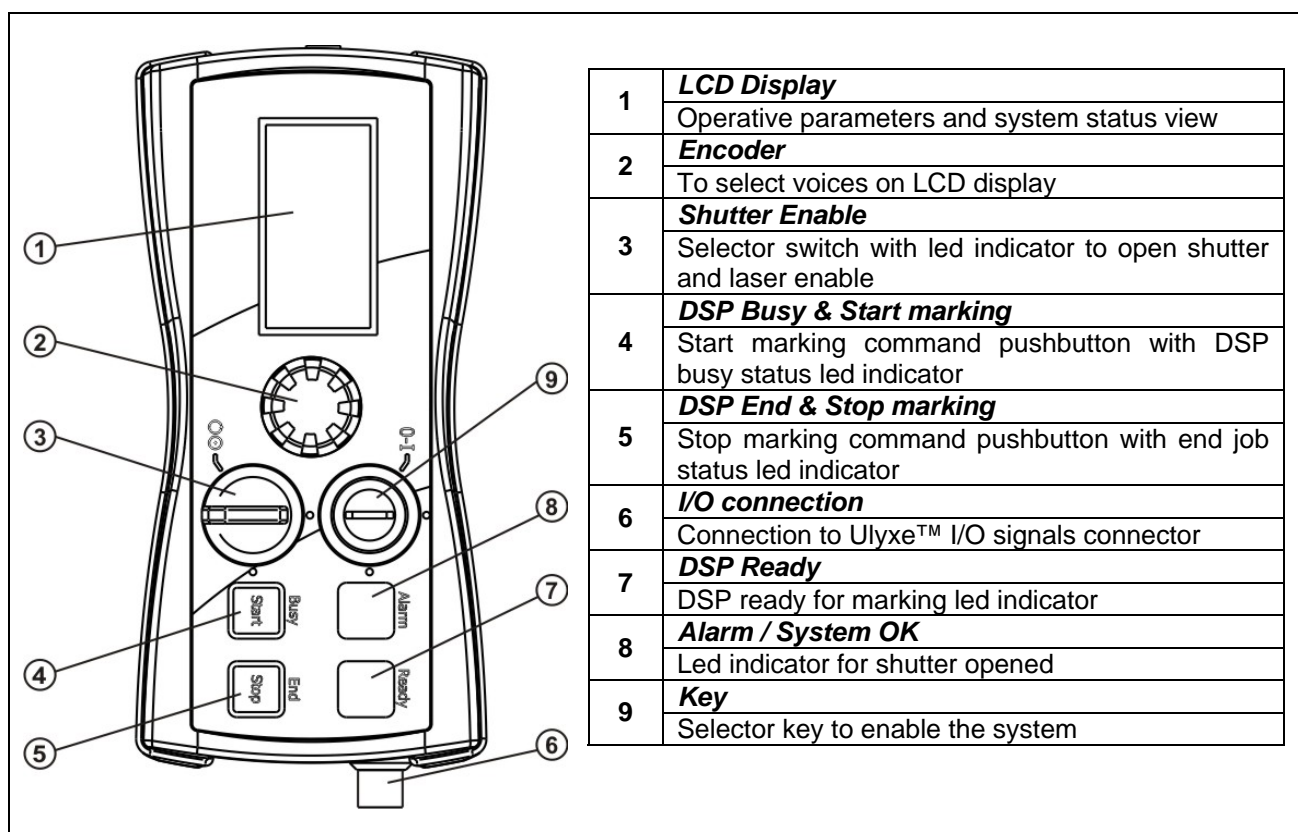


Figure 19: Control Box Evo.

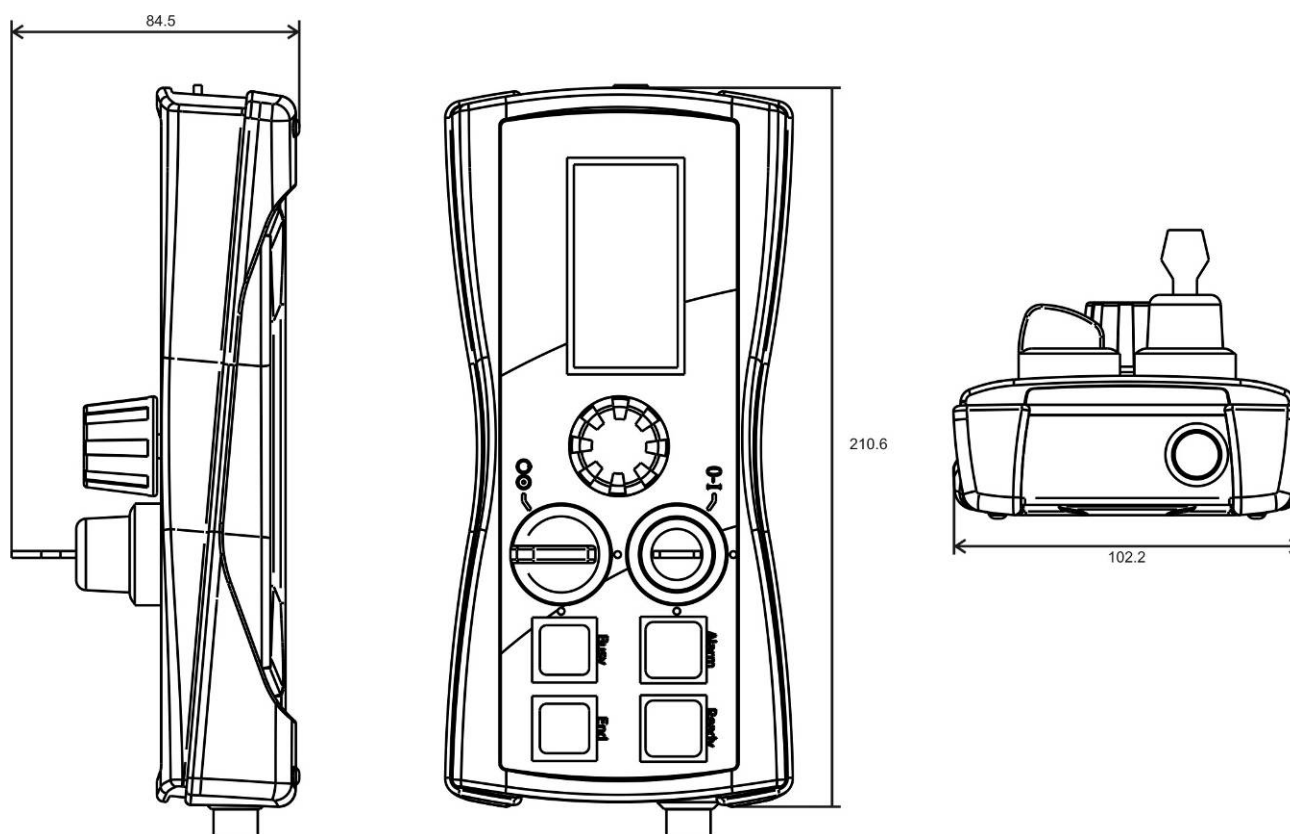


Figure 20: Control Box Evo overall dimensions.

CHAPTER 1

1.4.4 FOCUS LENS

On request are available various focus lens models to permit different marking areas in order to your best solution (consult chapter 2.7 for more details).



Focus (internal fixing)	Marking Area
63 (Ø 47mm)	35x35 mm
100 (Ø 47mm)	50x50 mm
160 (Ø 47mm)	100x100 mm
254 (Ø 47mm)	140x140 mm
330 (Ø 90mm)	220x220 mm

Figure 21: Focus lens.

1.4.5 SUITCASE

Plastic material (ABS) simple and ergonomic suitcase with expanded polypropylene material inside worked to content and protect device and optionals.

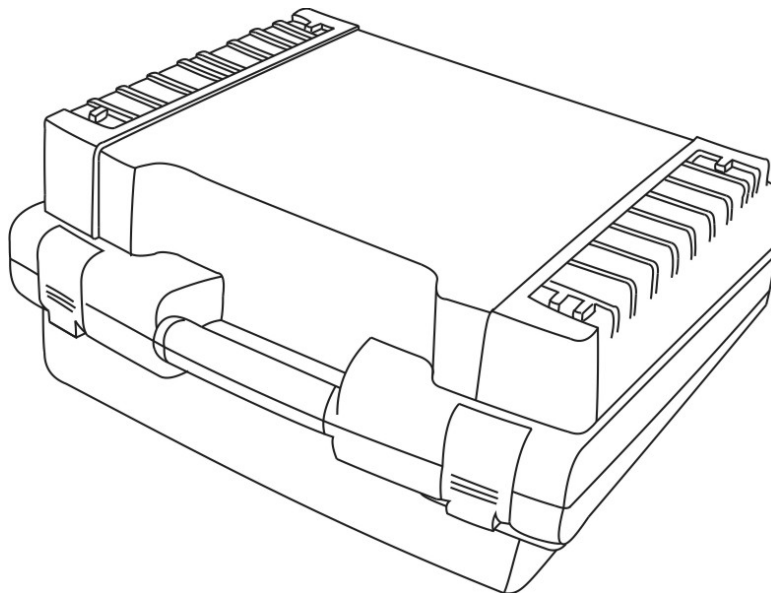


Figure 22: Suitcase.

EXTERNAL DIMENSIONS: WxHxD 500x420x225 mm

INTERNAL DIMENSIONS: WxHxD 459x420x210 mm

1.4.6 HEAVY DUTY SUITCASE

In addition to standard suitcase is available *Heavy Duty* model for more critical shipment or trip.

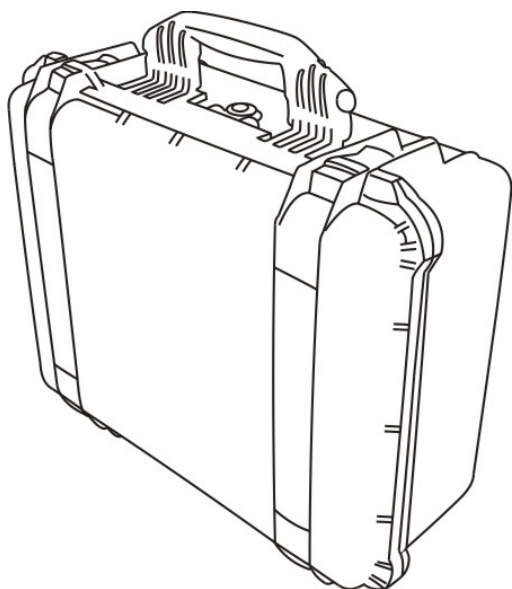


Figure 23: Heavy Duty suitcase.

Specification

Body	Latch	Lid O-ring	Pins
Polypropylene	ABS	Polymer	Stainless Steel
Foam	Purge Body	Purge Vent	Purge O-ring
1,3lb Polyurethane	ABS	3 micron Hydrophobic Non-woven PET	70 Shore Nitrile
External Dimensions LxWxD		Internal Dimensions LxWxD	
524x428x206 mm		468x355x193 mm	
Weight w/Foam	Weight w/o Foam		Buoyancy Max.
5,4 Kg	4,8 Kg		31,7 Kg

- Range Temperature: -40°C / 99°C
- IP67

1.4.7 FOCUS BEAM LASER DIODE

In order to have the right focus on Z axis is possible to request a focusing beam laser diode in addition to aiming beam laser diode.

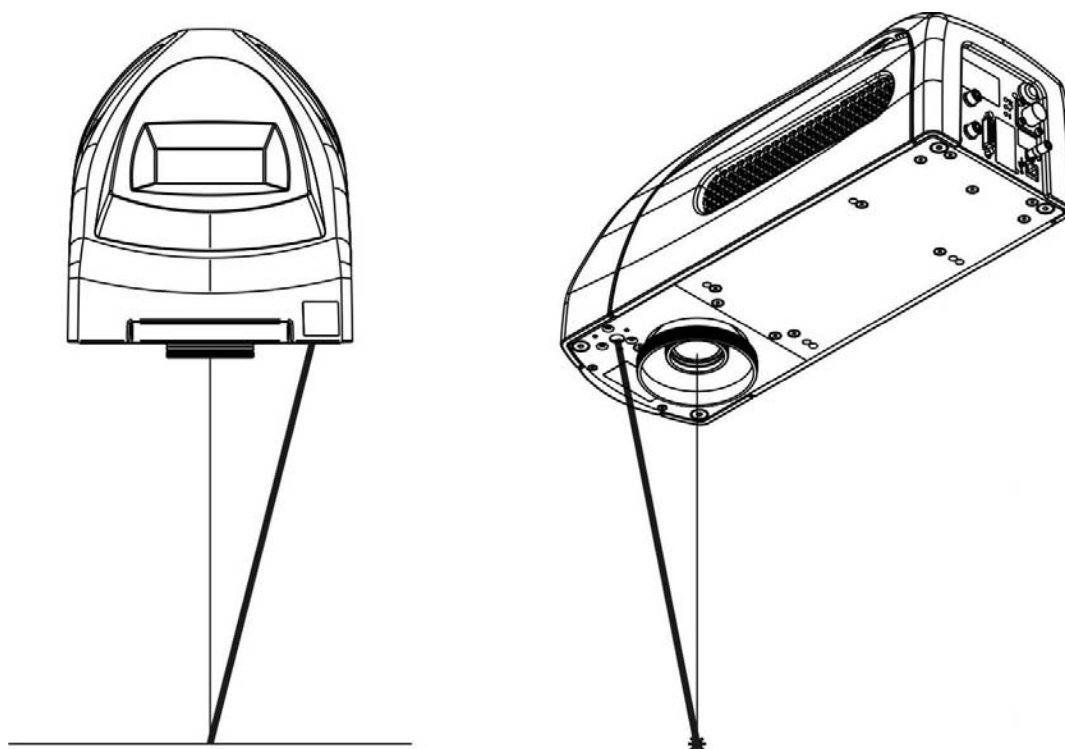


Figure 24: Focusing and aiming beams laser diodes.

CHAPTER 1

2 : INSTALLATION AND SET UP


NOTE:

ULYXE™ is a class 4 laser. For a right operation in safety mode it's necessary to convert the system to a class 1.

Ulyxe™ need to be installed in an appropriate environment, dedicated to laser operations. Laser Safety Officer must to isolate that area from others work areas and shows with appropriated danger warnings to inform about access denied to unauthorized personnel to laser marking area. See appendix for more details.

2.1 PREREQUISITES FOR INSTALLATION

To be able to work it is necessary to have available:

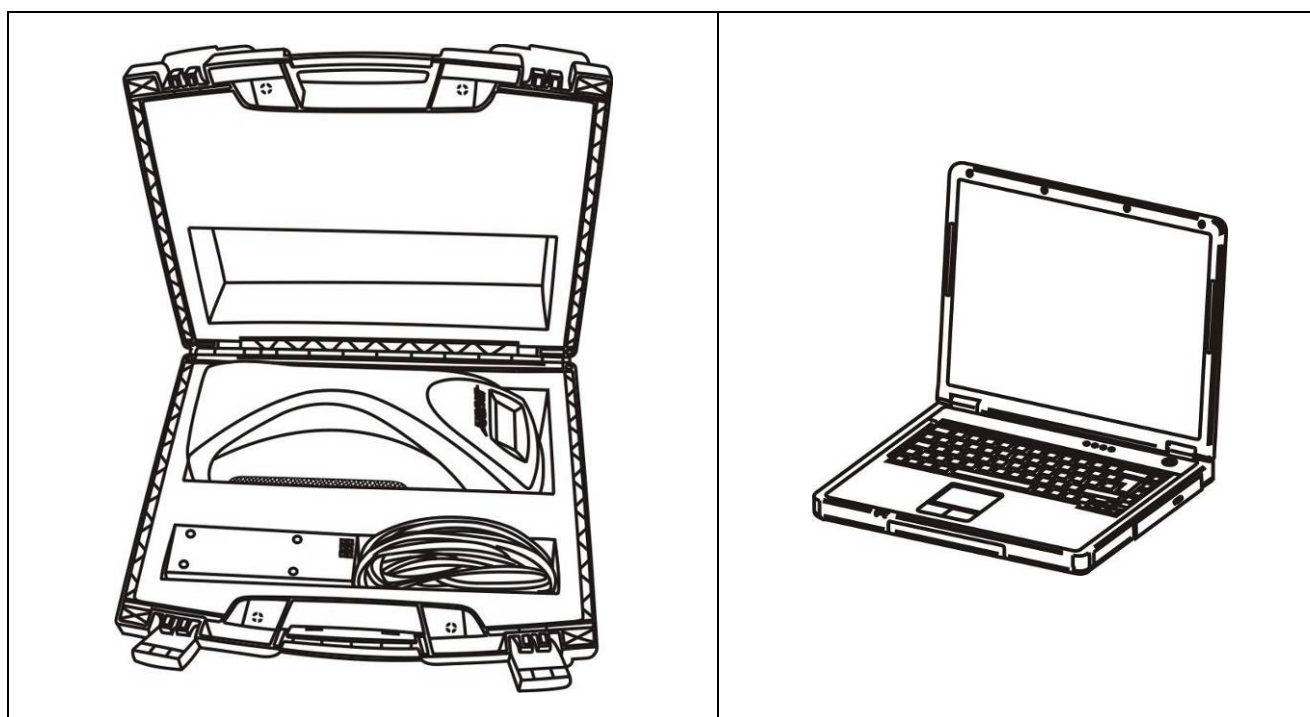


Figure 25: Prerequisites for installation.

Ulyxe Editor software need to be installed on a PC or a laptop that will be used with Ulyxe™ by an USB 2.0 connection. See chapter 2.6 for installation procedure. To be able to install and operate with Ulyxe Editor on PC following minimal requirements are needed:

Processor	32 bit (x86) processor or 64 bit (x64) at 1GHz or highest
Operative System	Windows® XP SP2 Professional; Windows® Vista Business or Ultimate and Windows® 7 Professional or Ultimate
RAM Memory	1 Gb (32 bit) or 2 Gb (64 bit)
Hard Disk	1 Gb of free space on hard disk (32 bit) or 2 GB (64 bit)
Graphic card	Minimal resolution 800 x 600 (1280 x 1024 recommended)
USB	USB 2.0
Furthers	CD-ROM player

CHAPTER 2

2.2 ULYXE™ TRANSPORT

To be able to positioning and wiring Ulyxe™ will be necessary its movement. Ulyxe™ can be easy raised and transported by a single person thanks to its small dimensions and contained weight.

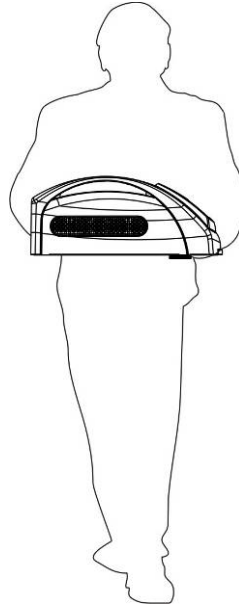


Figure 26: Ulyxe™ transport.

Be careful to don't damage the system during the movement. Don't shake.

2.3 FIXING AND POSITIONING

Ulyxe™ marker need to be positioned in safety mode and fixed and fixed on an appropriate plan, parallel to floor and absolutely with no vibrations. To prevent marker distortions, install a vibrometer on marking base plate and check vibrations absence during marking process.

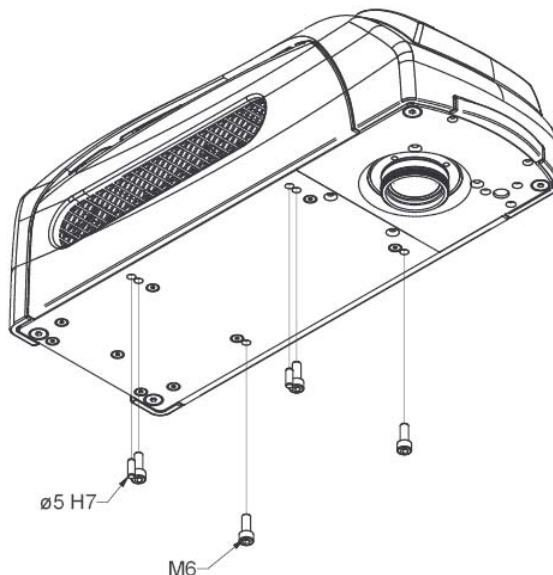


Figure 27: Ulyxe™ fixing points.

It's very important to fix the machine first of begin to marking because a not capable fixing or positioning can causes serious damages.
Don't fix the system in different as shown in figure.

Ulyxe™ is equipped with 4 threaded holes and 2 fixing pins.

Screws	M6
Fixing pins	Ø5 H7

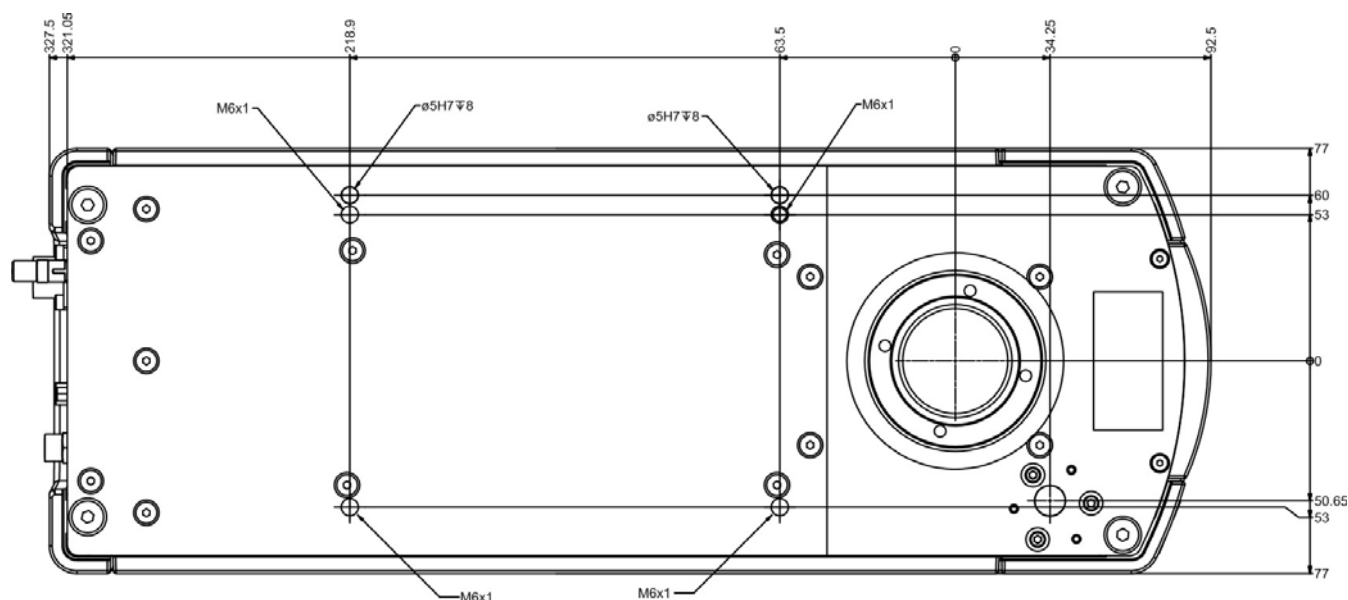


Figure 28: Measures, distance threaded holes and fixing pins drivers.

2.4 INSTALLATION ENVIRONMENT

Ulyxe™ need to be installed in an appropriate environment to be able a right air flow on the system and for a correct cables passage as shown in figure.

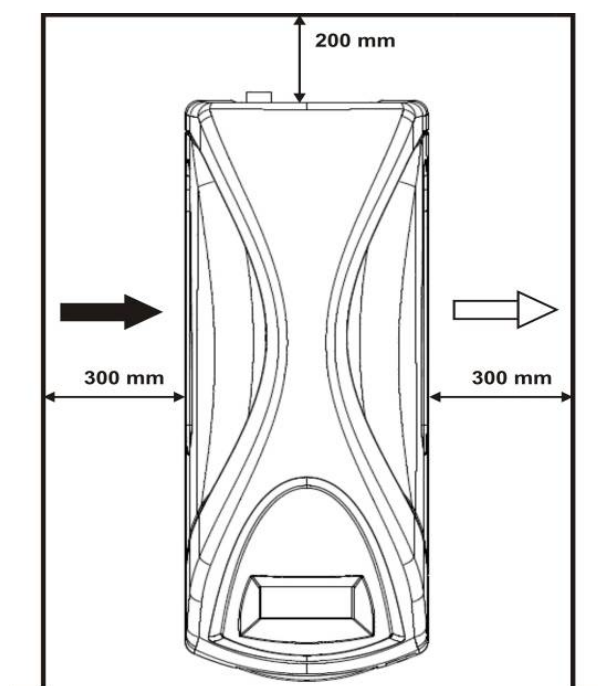


Figure 29: Installation environment.

CHAPTER 2

2.5 CONNECTIONS

2.5.1 PLUG-IN AUX INTERLOCK CONNECTOR

Plug Aux interlock connector to Ulyxe™. Connector absence defines a stop of the system.

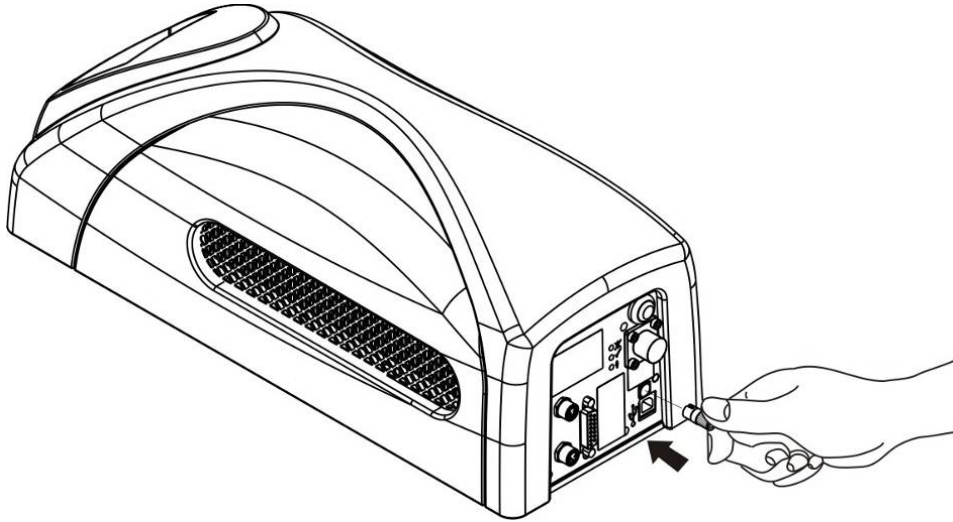


Figure 30: Aux Interlock connector plug.

2.5.2 POWER SUPPLY CONNECTION

Connect power supply cable to Ulyxe™. Check connector right orientation and plug in. Once plugged in check also right coupling between two connectors parts.

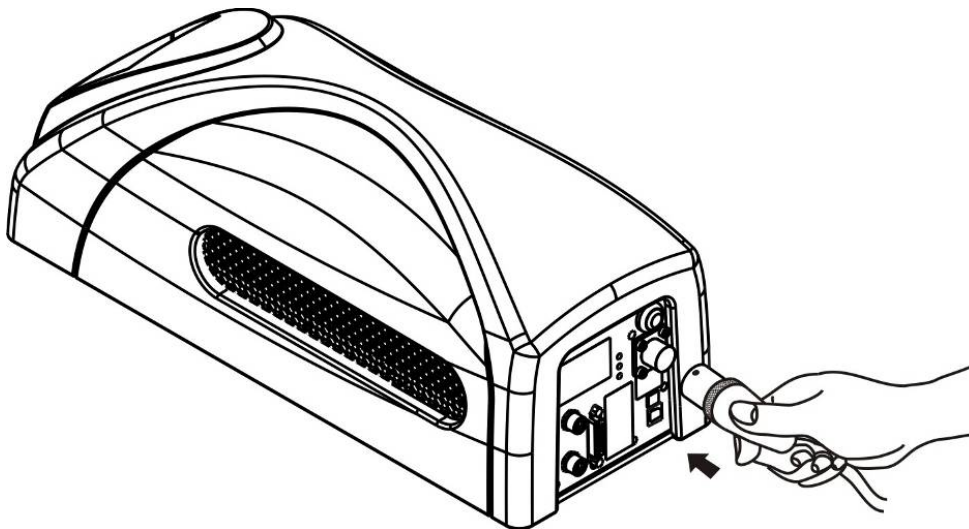


Figure 31: Power Supply cable plug in.



NOTE:

Ulyxe™ needs a **safety circuit** for emergency. Consult chapter 2.8 for more details.



NOTE:

Ulyxe™ needs a 24V DC stabilized supply voltage 13A max current absorption. It is suggested to use **BOXED POWER SUPPLY KIT** option. See following chapter for further information.

2.5.3 CABLING BOXED POWER SUPPLY KIT (OPTIONAL)

BOXED POWER SUPPLY KIT contents a switching power supply with 85÷265Vac (47÷63Hz) voltage input and 24V DC, 14A output and a main lead. For any further information on available accessory options follow dedicated chapter 2.5.5.

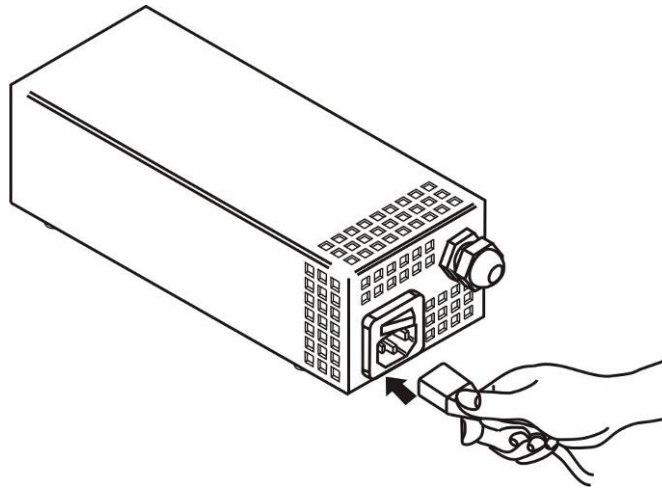


Figure 32: Main lead connector insertion.



NOTE:

Connect **Ulyxe™** to PC through USB cable only **after** Ulyxe Editor software installation. **DON'T CONNECT** USB cable until it is not required from installer.

2.5.4 PLUG IN SIGNAL KEY CONNECTOR

Connect Signal Key (laser signals control key) to Ulyxe™ device as shown in figure. In the case of Control Box Basic or Control Box Evo option is not available consult following chapter.

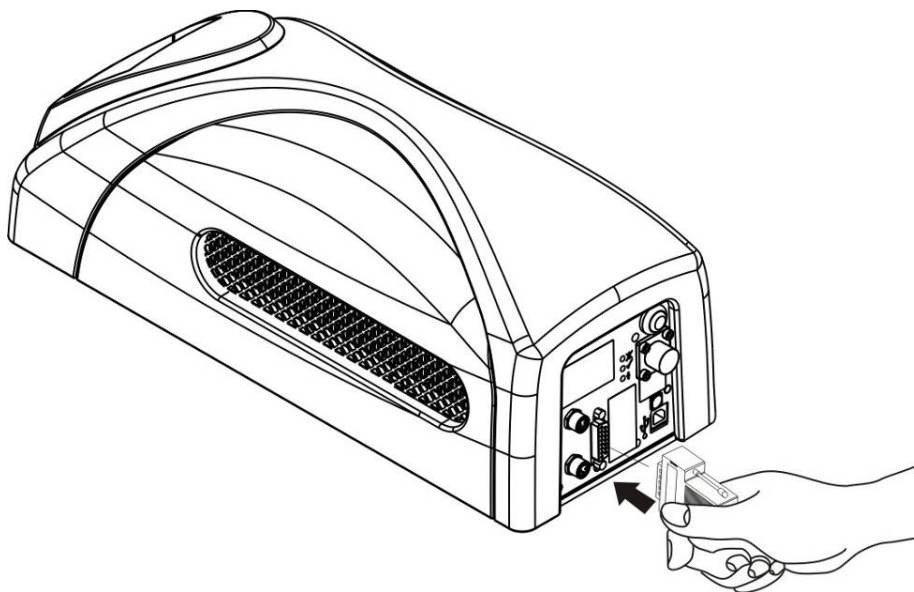


Figure 33: Plug-in signal key connector.



NOTE:

Signal Key equipped **need to be connected** inside as shown in chapter 2.8, figure 57. In option it is possible to use Control Box accessory (chapter 1.4 – Accessories).

CHAPTER 2

2.5.5 CONTROL BOX BASIC CONNECTION (OPTIONAL)

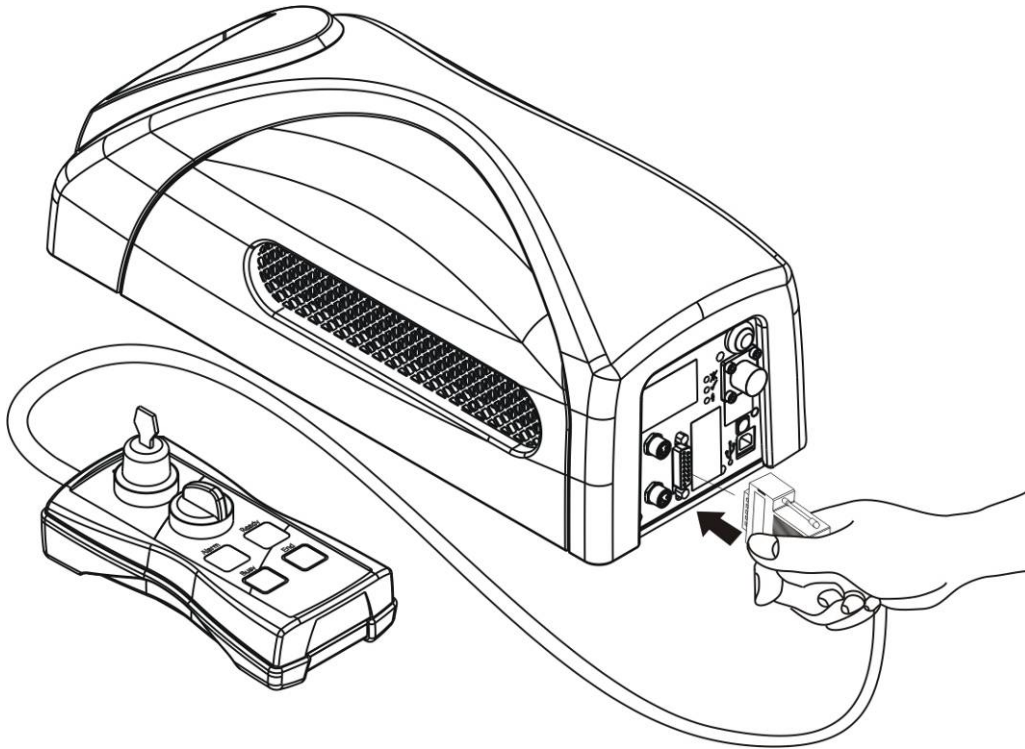


Figure 34: Control Box Basic connection.

2.5.6 CONTROL BOX EVO CONNECTION (OPTIONAL)

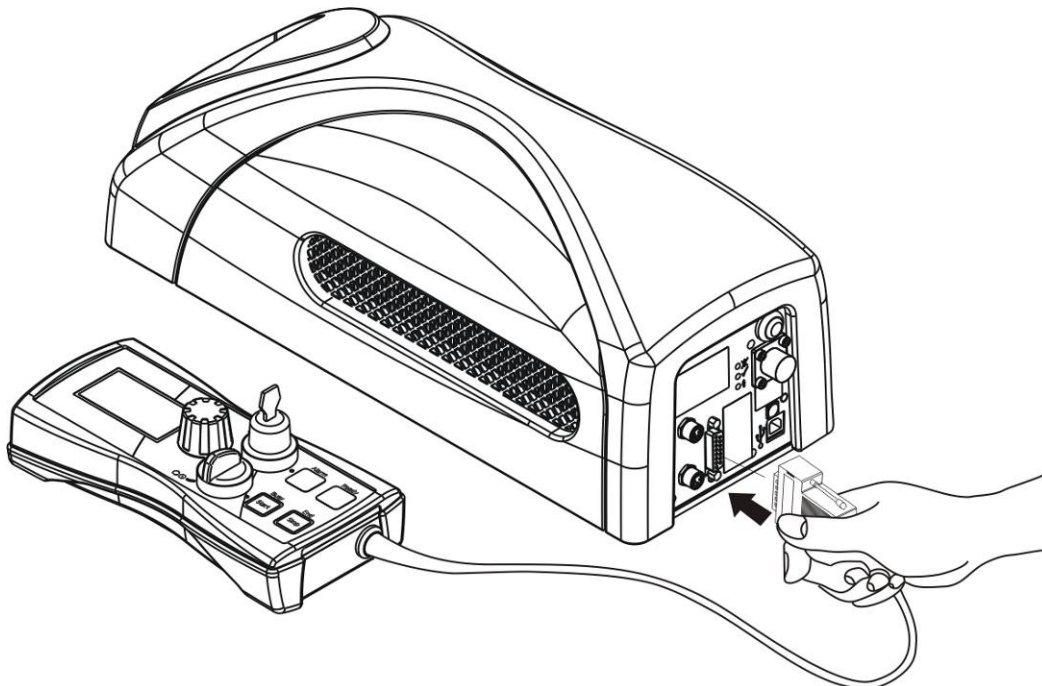


Figure 35: Control Box Evo connection.

2.6 ULYXE EDITOR SOFTWARE INSTALLATION

Ulyxe Editor installer executable file is located on USB pen drive supplied with equipment. Proceed following below instructions:

- 1) Insert USB pen drive on the PC that will be used with Ulyxe™;

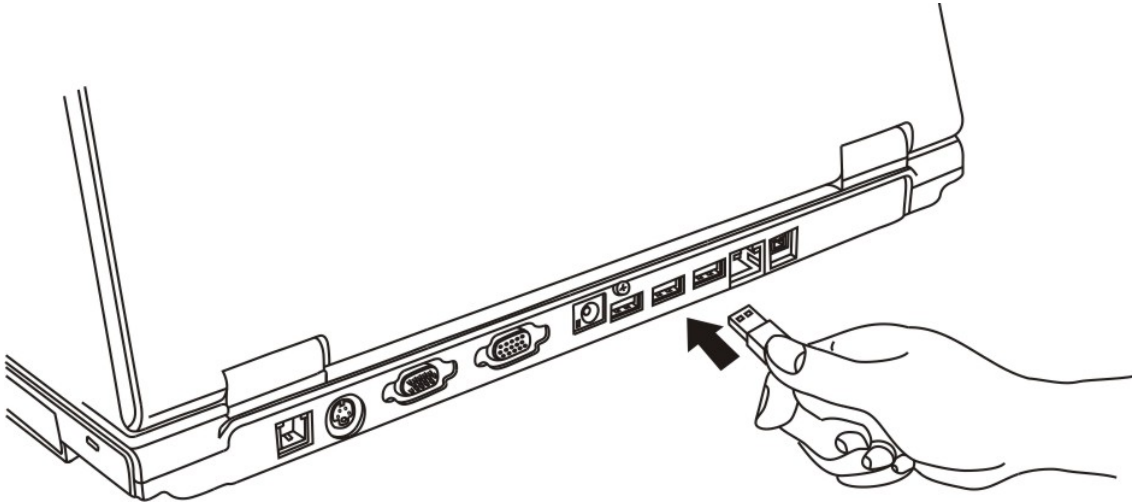


Figure 36: USB pen drive insertion on PC.



NOTE:

ULYXE™ **works** only and exclusively with **USB 2.0 Full Speed** device connections. For any further information consult **USB 2.0 ADVICE** chapter.



NOTE:

Administrator rights are required for Microsoft® Windows 7!



NOTE:

Connect ULYXE™ to PC **only after installer software request!**

- 2) Launch executable installer and select NEXT to continue;

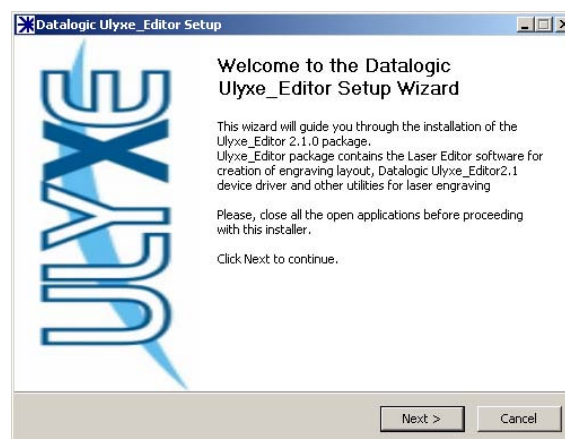


Figure 37: Start Wizard installation.

CHAPTER 2

- 3) select I AGREE to accept licence agreement and to continue with installation;

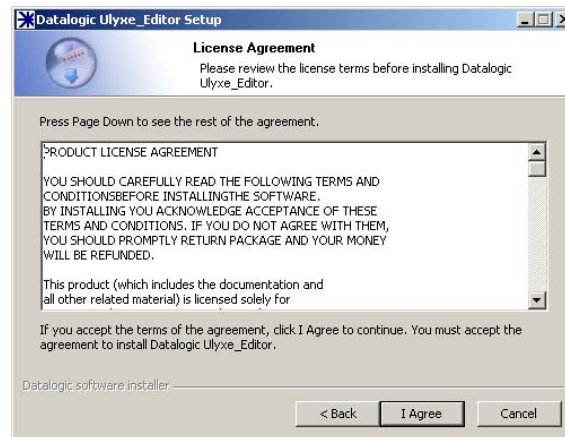


Figure 38: License agreement.

- 4) choose installation destination folder and select NEXT;

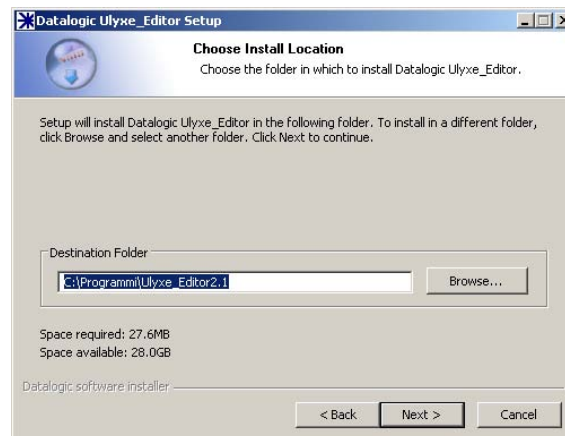


Figure 39: Installation destination folder.

- 5) Select installation type and proceed with INSTALL;

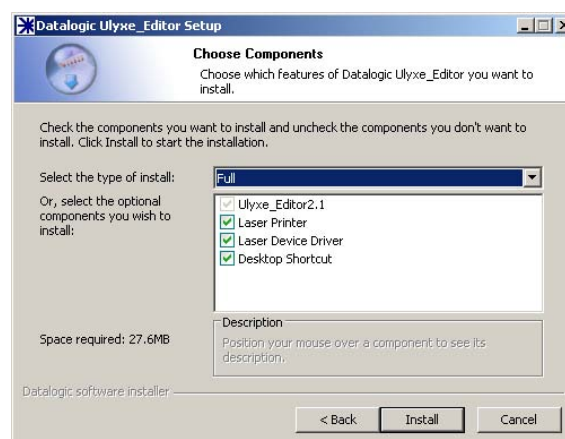


Figure 40: Installation type options.



NOTE:

Consult **Ulyxe Editor** manual for more details about installation type options.

- 6) Microsoft® Windows could show to user that it can't verify the publisher of software driver and its compatibility; select CONTINUE to proceed with installation;

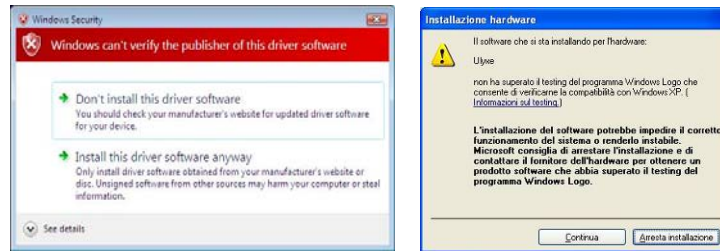


Figure 41: Not certified driver supplier warning from Microsoft® (Vista/7 and XP).

- 7) During installation will be requested to plug ULYXE™ USB cable;



Figure 42: USB cable plug in request.

Insert hence USB cable first on Ulyxe™ device and after to PC.

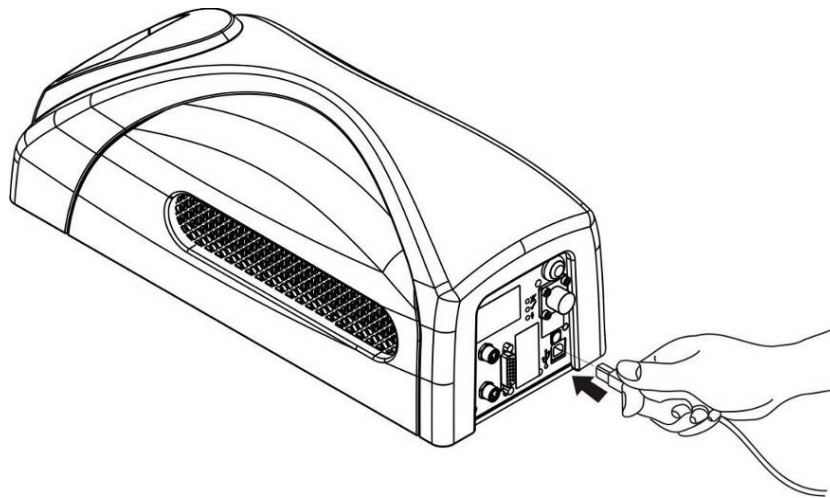


Figure 43: USB cable to Ulyxe™ connection.

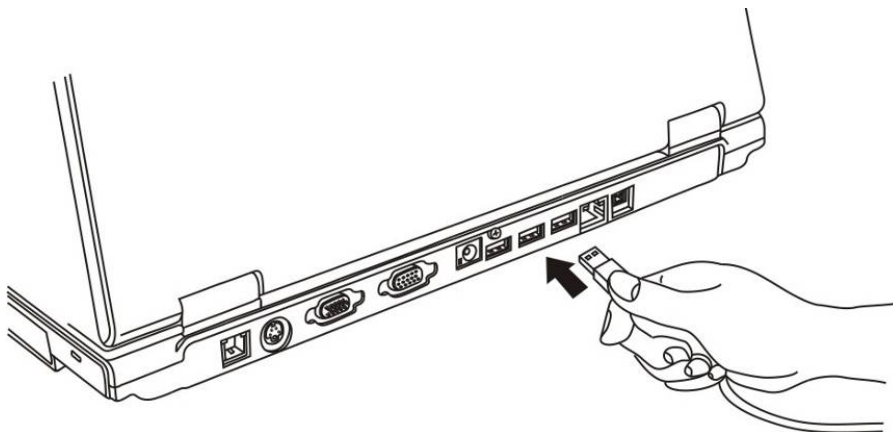


Figure 44: USB cable to PC connection.

CHAPTER 2

WARNING: if **WINDOWS VISTA** or **WINDOWS 7** is used jump to step 11.

- 8) Once Ulyxe™ is connected to PC, Operative System shows new hardware found message, choose option “No, not now” and select NEXT;



Figure 45: New hardware found message window.

- 9) Select option “*Install the software automatically (recommended option)*” and continue with NEXT;

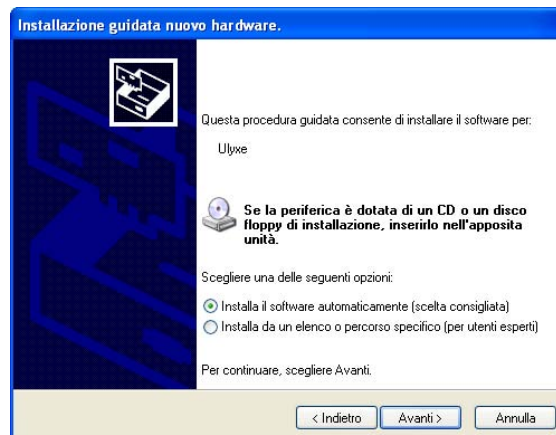


Figure 46: Automatic installation of the software.

- 10) Research function and driver installation will begin. At the end of operation select FINISH;



Figure 47: New hardware installation completed.

- 11) to complete installation select FINISH;

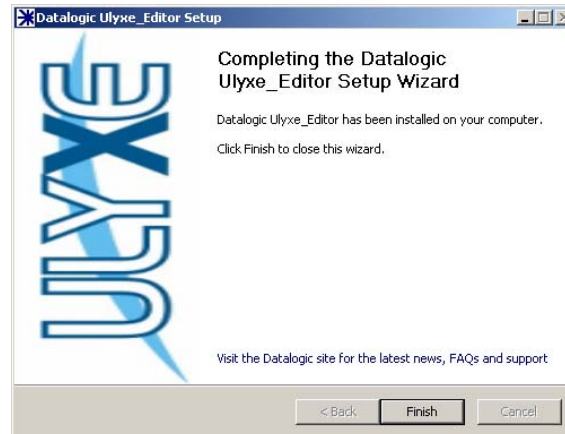


Figure 48: Installation completed.

- 12) at the end of installation, as last operation, copy `LASER.INI` file from USB pen drive supplied to installation directory just created `X:\xxxxxx\Ulyxe_Editor2.x\Bin`.

Concluded this procedure, Ulyxe™ is ready to use.

At the first start of Ulyxe Editor it is possible that firmware upgrade will be required. This procedure happens only in case of Ulyxe™ contains a different firmware version than from new installation.

Proceed as follow:

- 1) To begin firmware upgrade procedure select UPGRADE NOW;

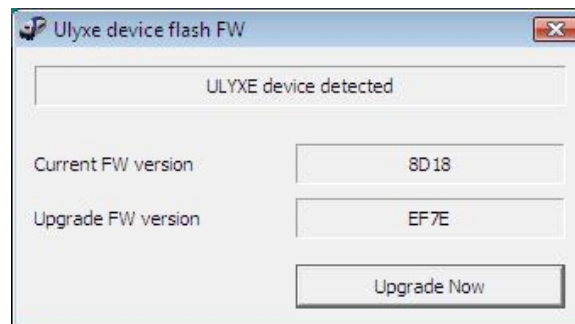


Figure 49: Firmware upgrade request.

- 2) Once firmware upgrade procedure has finished select DONE;

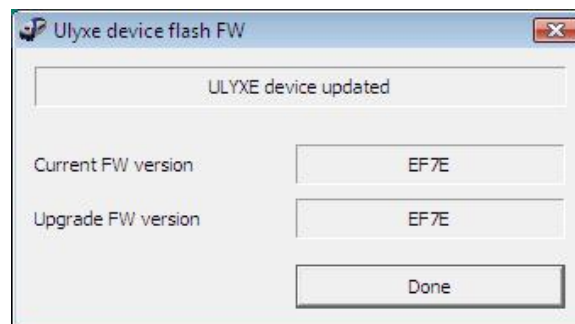


Figure 50: Firmware upgrade procedure completed.

CHAPTER 2

- 3) After firmware upgrade is completed switch off Ulyxe™ (if it is ON), disconnect USB connector from PC and select OK;

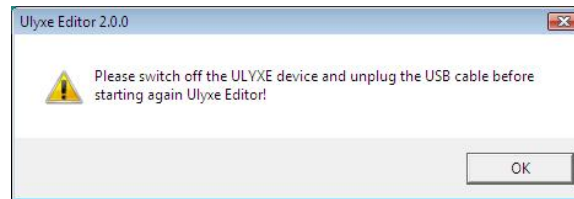


Figure 51: Disconnect USB cable message.

Reconnect USB connector to PC, turn on Ulyxe™ (see “**CHAPTER 3: Starting procedure**”) and launch Ulyxe Editor.

2.7 MARKING AREA

2.7.1 PRINCIPLE OF OPERATION

DATA TRANSFER

The commands transferred to the scan head by DSP board are commands for scanning straight line segments (vectors and polygons).

Each path to be marked by the scan head has to be divided in small line segments.

The commands spooler is transmitted by the PC to the DSP where a double circular buffer is available for the storage of this data.

After a start signal, data are transferred in analogue mode to the scan head in real time to positioning the mirrors on the galvanometer scanners.

Spooler commands

The DSP driver offers a set of functions to create and fill the marking spooler with commands for scan head, laser control and stepper motors control. Some of them are explained in detail hereafter.

The argument of a vector command is always the end point of the vector to be scanned. The start point is identical whit the end of the preceding vector. Closing the spooler whit the appropriate function causes the laser focus positioning at the centre of the image field.

Move_to spooler command

A move_to command effects a fast movement of the mirrors. The laser is turned off during a move_to. The jumping speed has to be defined by the dspSetJumpSpeed(...) function.

Scan_to spooler command

A scan_to command leads the laser focus to mark along a vector with constant velocity. At the beginning of the scan_to command the laser is tuned on if necessary (only if it was off).

The marking speed has to be defined by the dspSetScanSpeed(...). Usually the marking speed is lower than the jumping speed.

Each vector executed by the scan head after a move_to or scan_to command is divided in micro steps by the DSP. This division is necessary as the galvanometer scanners are controlled via analogue regulator circuits.

The shortest possible output interval is about 3µs (3.2µs on DSP1 and 2.8µs on DSP2.1 board) that means a maximum rate of about 300K coordinates/s (312.5K on DSP1 and 375K on DSP2.1) at the maximum resolution (step size = 1).

SIZE OF THE MARKING FIELD

The dimensions of the usable marking field are determined by the size of the scan angle and the focal length of the objective. For the indication of the coordinates 16 bit with sign are available for each axis. The origin of coordinates is in the centre of the field. The theoretical values for the x and y coordinate of points inside the image field are between -32768 and $+32767$.

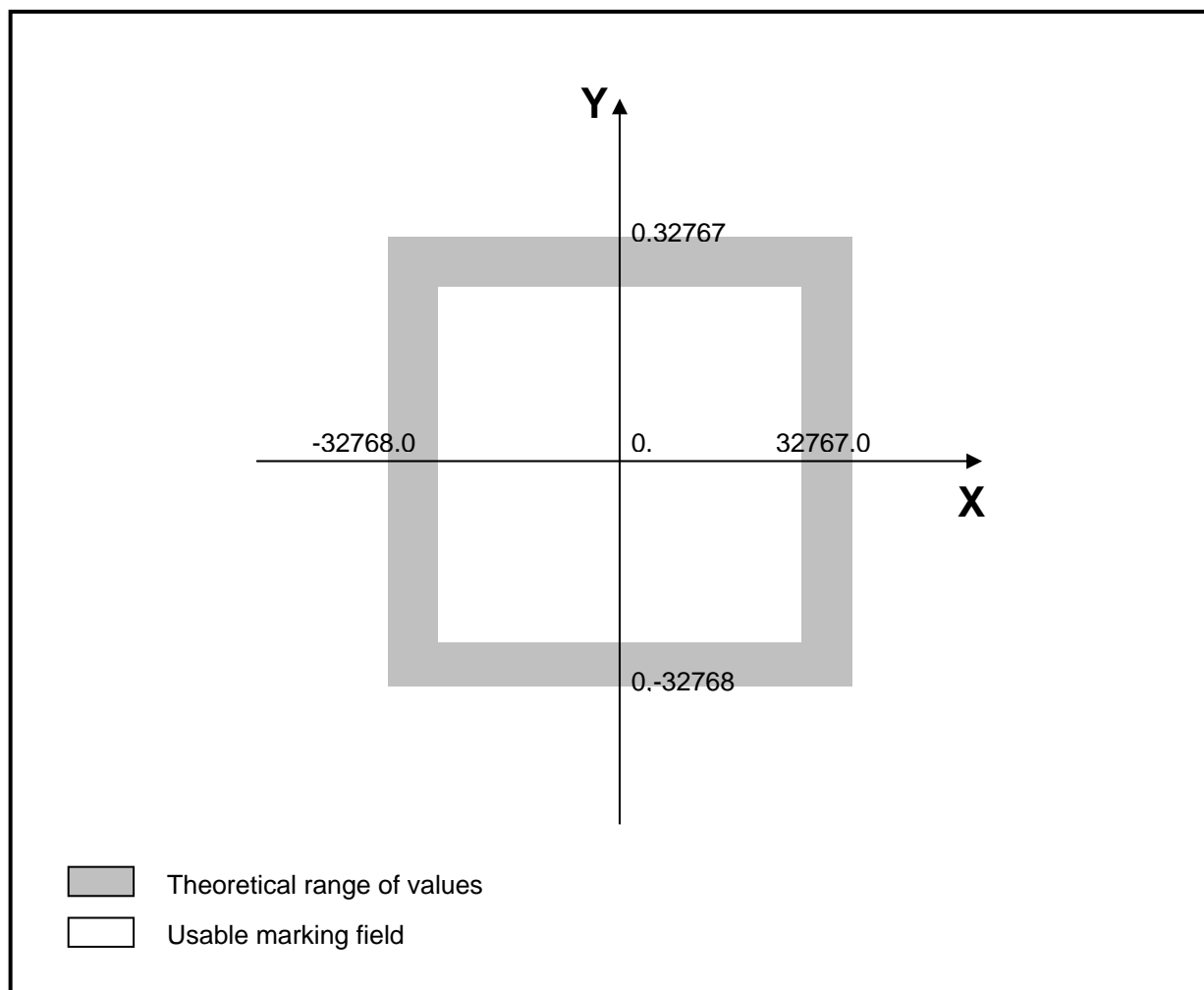


Figure 52: Size of the marking field

The interval defining the practicable x and y coordinates is shorter than the theoretical range of values. As there is no field correction outside the usable image field, the maximum values for the coordinates of points inside should not be exceeded.

CHAPTER 2

According to focal lenses used from Ulyxe™ it is possible to have different marking areas as follow:

FOCUS (mm)	MARKING AREA SIDE	WORKING DISTANCE
63	35	72
100	50	114
160	100	178
254	140	282
330	220	376

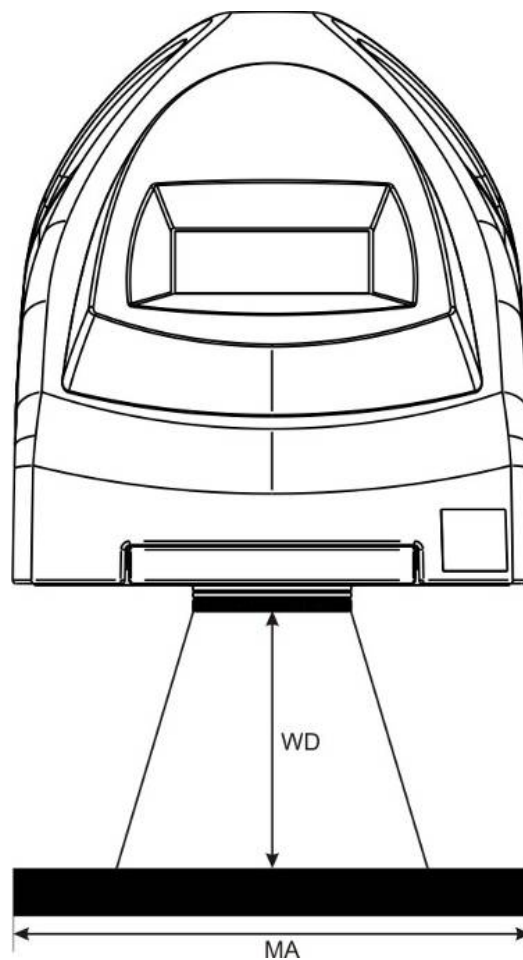


Figure 53: Working Area.

WD: Working Distance

MA: Marking Area

2.7.2 COMPENSATION OF FIELD

The scanning head used for laser engraving employs electrical drives to set the angular position of two mirrors and deflect the beam along the two directions X and Y. A simplified diagram is shown below (**Fig. 54**):

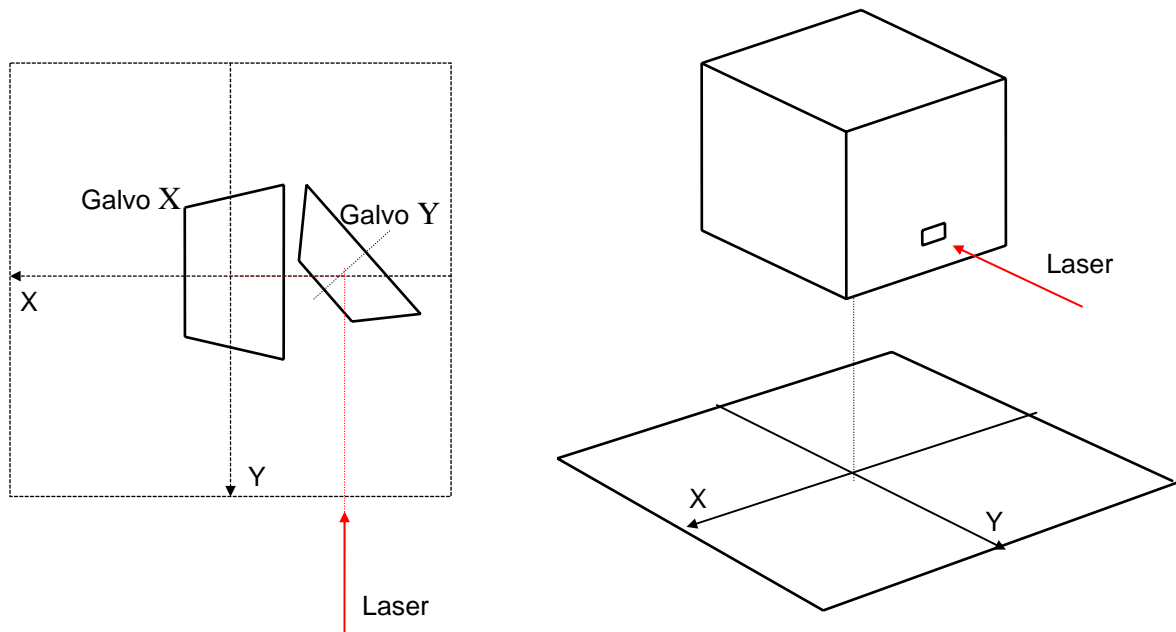


Figure 54: Scan head.

DISTORSIONS

The picture projected on the engraving surface by the two mirrors is deformed due to the different length of the optical paths for the different angles. Observe the next diagram (**Fig. 55**), the point on the plane does not follow a straight line parallel to the x axis as angle ϑ_x varies but it rather flows a trajectory which is similar to a parabola distancing the hypothetical line according to the two angles ϑ_x and ϑ_y .

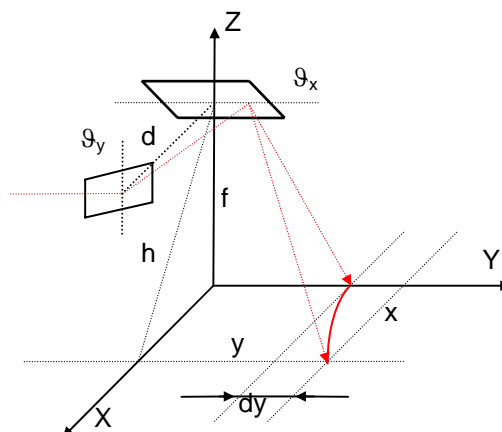


Figure 55: Field projection.

CHAPTER 2

The co-ordinates of the projected point can be computed with the following formula:

$$\begin{cases} x = f \cdot \tan(\vartheta_x) \\ y = (d + h) \cdot \tan(\vartheta_y) = \left[d + f \cdot \sqrt{1 + \tan^2(\vartheta_x)} \right] \cdot \tan(\vartheta_y) = \left(d + \frac{f}{\cos(\vartheta_x)} \right) \cdot \tan(\vartheta_y) \cong f \cdot \frac{\tan(\vartheta_y)}{\cos(\vartheta_x)} \end{cases}$$

The error - i.e. the discrepancy between the real y and the ideal value according to variations of ϑ_x - is:

$$\Delta y = f \cdot \frac{\tan(\vartheta_y)}{\cos(\vartheta_x)} - f \cdot \tan(\vartheta_y) = f \cdot \tan(\vartheta_y) \cdot \left(\frac{1}{\cos(\vartheta_x)} - 1 \right)$$

As a result, the angular correction to be applied to ϑ_y for compensating this distortion is:

$$\Delta \vartheta_y = \tan^{-1} \left(\frac{\Delta y}{f} \right) = \tan^{-1} \left[\tan(\vartheta_y) \cdot \left(\frac{1}{\cos(\vartheta_x)} - 1 \right) \right]$$

BARREL DISTORSION

The applied objectives for the scanner heads, beside giving the focus on the working plane, apply a deformation called *Barrel*, which eliminates the dependency from the tangent.

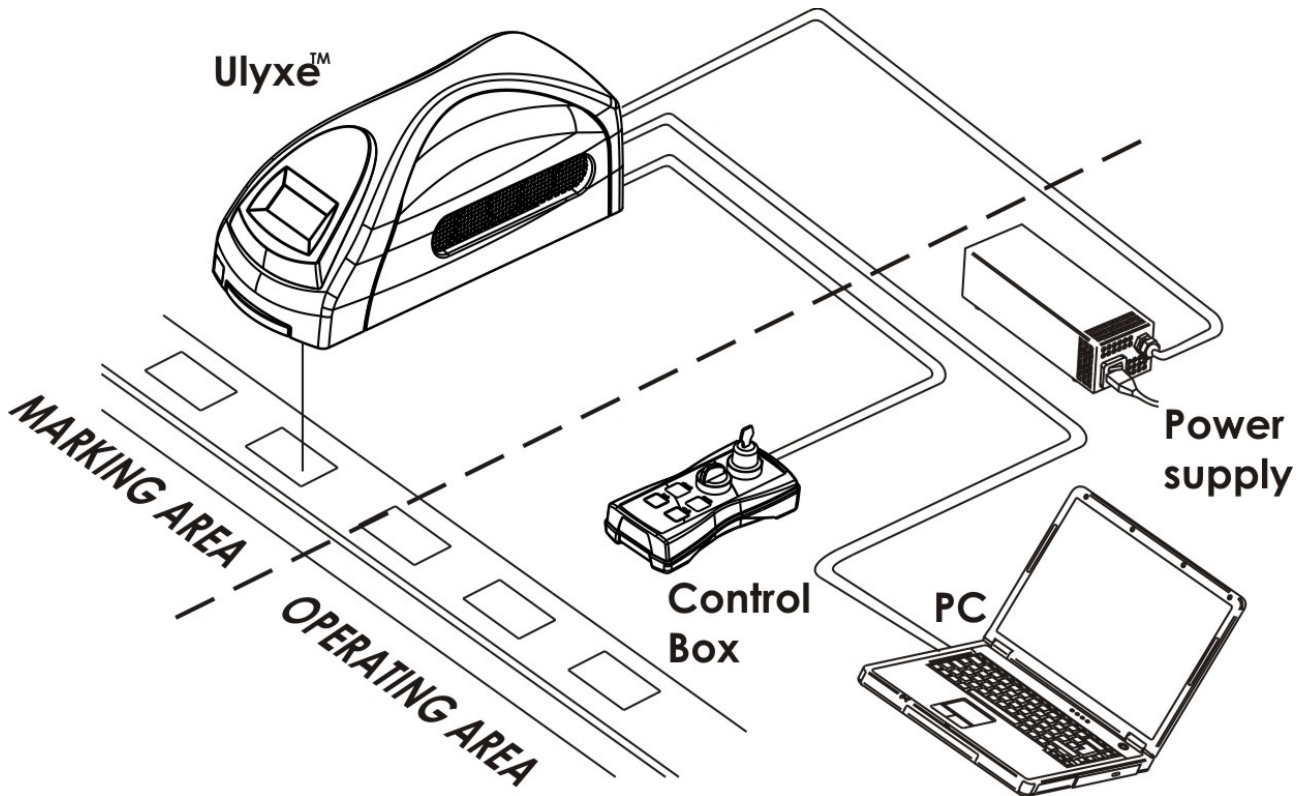
$$y = h \cdot \vartheta_y$$

The use of this kind of objectives should simplify the job of the software, eliminating the distortions of the tangent.

According to focal lens used it is necessary to respect right working distance. Marking Area is always a square field.

2.8 EXAMPLE OF APPLICATIONS AND EXTERNAL CONNECTIONS

Handy and simple installation of Ulyxe™ allow to make it easy to use also in line production applications.



* External devices connected are optional parts. For further information refer to chapter 1.4

Figure 56: Example of external connections.



NOTE:

The operator **SHOULD NOT** enter in the marking area during the marking process!



NOTE:

It is important to install an **emergency circuit** able to cut 24V DC power supply voltage (or indirectly on 110/220Vac) switching off **Ulyxe™** entirely. This safety circuit needs to be installed from qualified personnel only.



NOTE:

To obtain a good marking quality, and not to decrease life time, we recommend a ventilation or suction in a protection box to limit dust due to marking phase.

CHAPTER 2

POSSIBLE EXTERNAL CONNECTIONS.

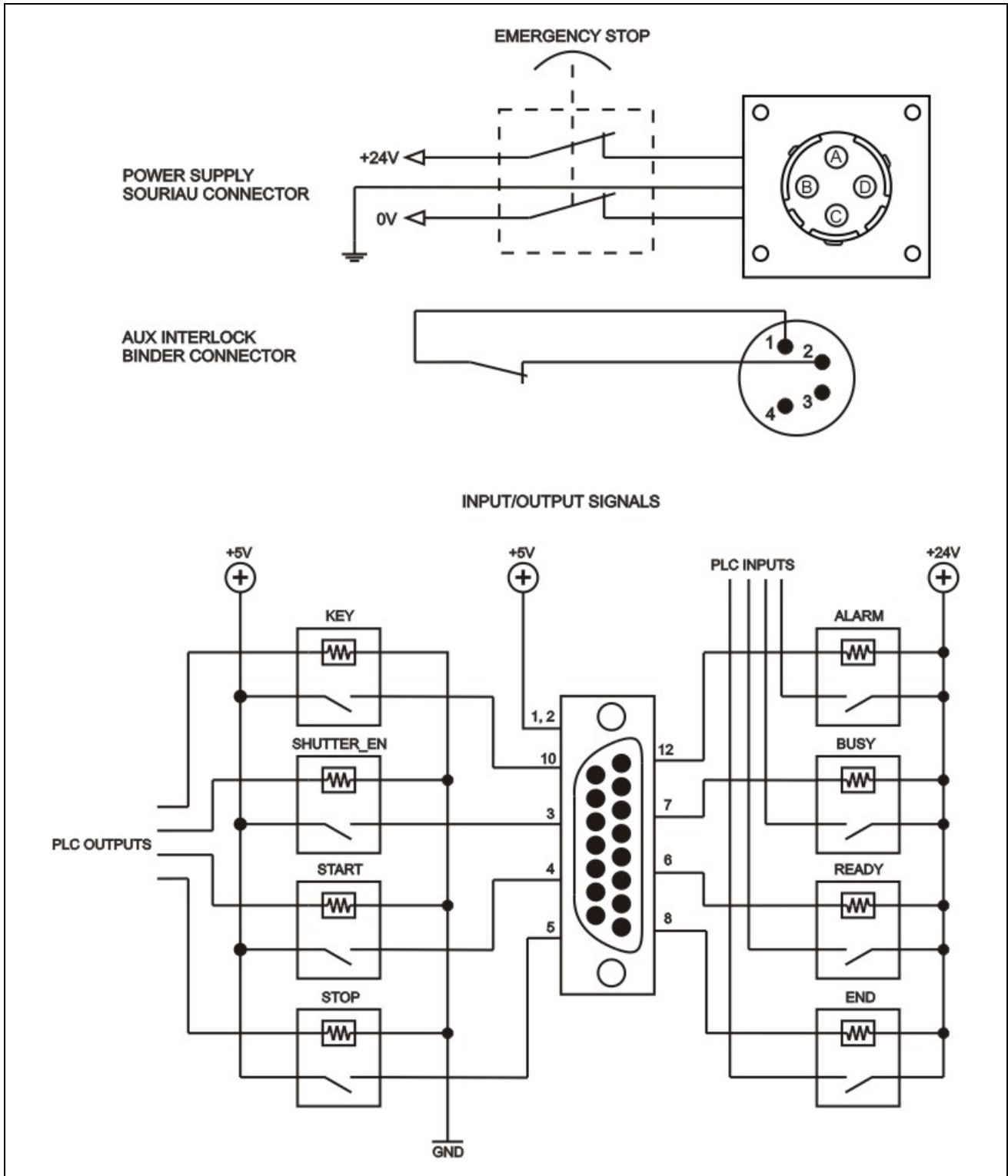


Figure 57: Possible external connections.

* See chapter 4.2 for more information.

2.9 MATERIAL PROCESSING

Here below indicative parameters for different material processing (metal, plastic) are specified.
Use the indicated values only as reference parameters:

MATERIAL	PARAMETERS	ANNEALING	COLOR MARKING	ABLATION
Metal				
	Power (W)	70 – 80%	70 – 80%	100%
	Frequency (KHz)	75	60 – 80	10 – 20
	Speed (mm/s)	100 mm/s	50 – 200 mm/s	> 200 mm/s
	Filling	Single 0,05	Single/Cross 0,02 – 0,05	--

MATERIAL	PARAMETERS	COLOR CHANGE*	FOAMING
Plastic			
	Power (W)	Ca. 80%	70 – 80%
	Frequency (KHz)	30 - 80	> 40
	Speed (mm/s)	> 200 mm/s	--
	Filling	--	--

* Consider the additives that are added to the plastic.

CHAPTER 2

3 : UTILIZATION AND OPERATIONS

3.1 STARTING PROCEDURE

First to proceed with turn on the Ulyxe™, insure to a right device connection like described previously. Check presence of voltage power supply connector, aux interlock connector, Signal Key connector (or Control Box) and USB cable. Proceed as follow:

- 1) power on Ulyxe™ with 24V DC voltage (turn on power supply if present):

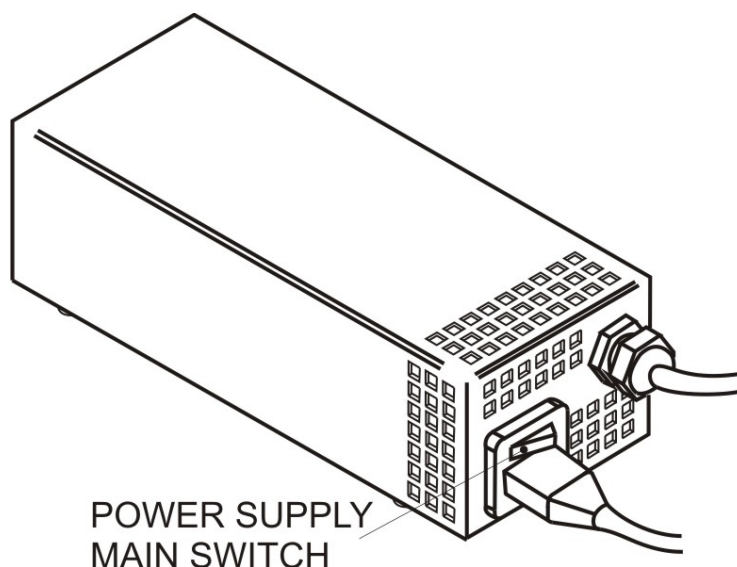


Figure 58: Boxed power supply with main switch.

- 2) press back panel main switch of Ulyxe™:

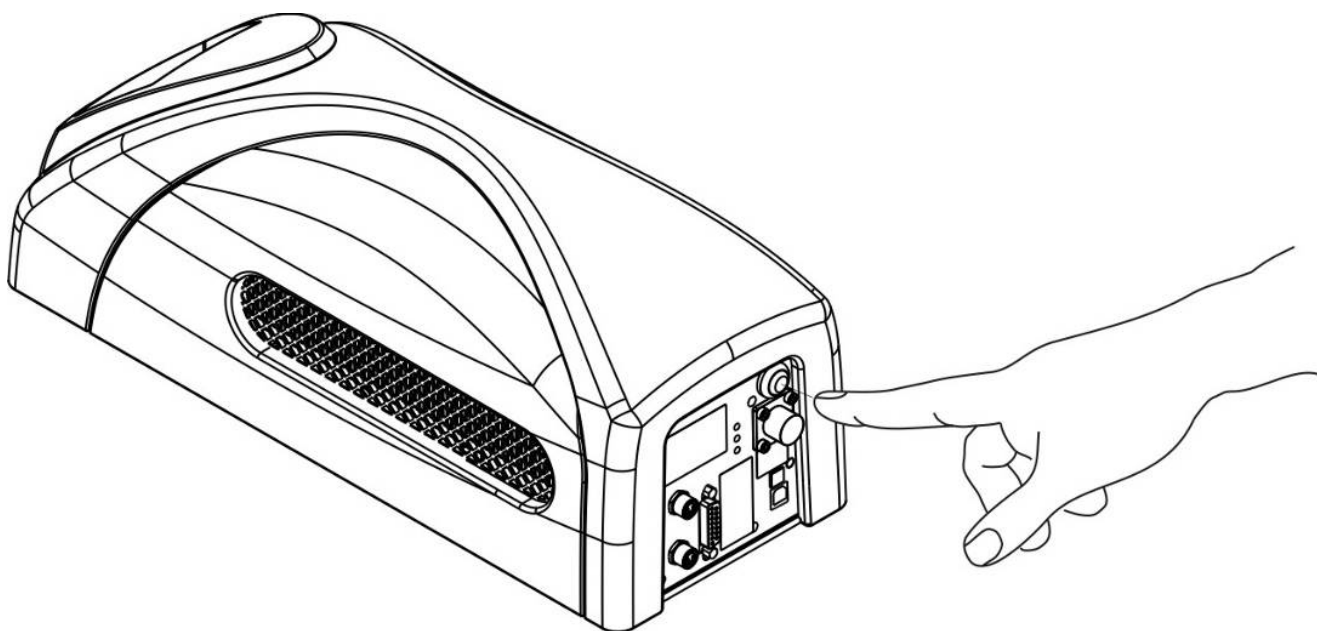


Figure 59: Ulyxe™ main switch.

CHAPTER 3

If power supply input is correct green led indicator on back panel will light on otherwise if there is a reversed voltage input red led indicator on back panel will light on. Refer to troubleshooting paragraph in case of error:

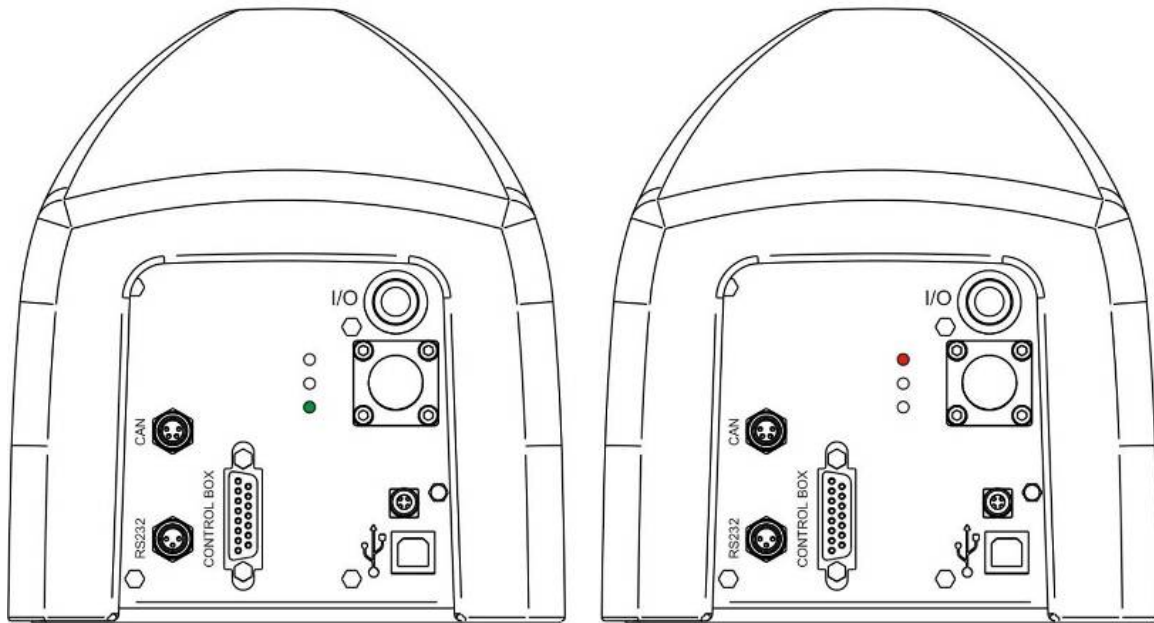


Figure 60: Green and red leds on back panel.

3) turning on Ulyxe™ the fans cooling system will be powered on and it will be showed LCD firmware version on display temporarily, then led bar will be lighted on in orange colour until system power on time will be not completed:



Figure 61: Starting system.

4) immediately after led bar is lighted off Ulyxe™ remains in waiting for key start mode and power module is off:



Figure 62: Waiting for key start.

5) enable key signal to start Ulyxe™ and wait for a moment to permit system warm up. After this operation led bar will come green blinking.

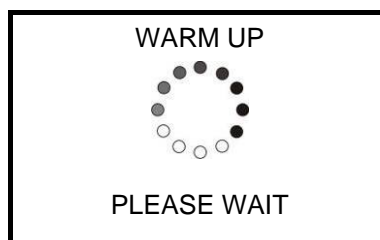


Figure 63: Waiting for warm up.

6) once warm up is completed Ulyxe™ is ready to use waiting external *enable* command and led bar comes green:



Figure 64: System waiting enable command.

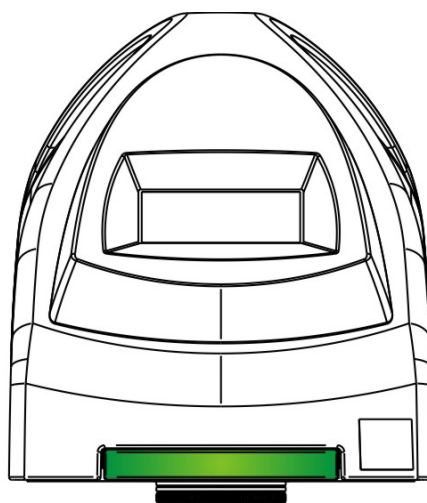


Figure 65: Led bar green: stand-by system status.



NOTE:

If aiming and focusing beam laser diodes setup are in automatic mode they'll be light on.



NOTE:

Aiming and focusing beam laser diodes are in Class 3R.

Ulyxe™ is ready for operation. See chapter 4.3 for touch screen display functions.



NOTE:

For information about use of **Ulyxe Editor** software, see the related manual.

CHAPTER 3

7) activate *enable shutter* command to open mechanical shutter. Led bar comes orange. ALARM signal will be active and yellow led indicator on back panel will light on.

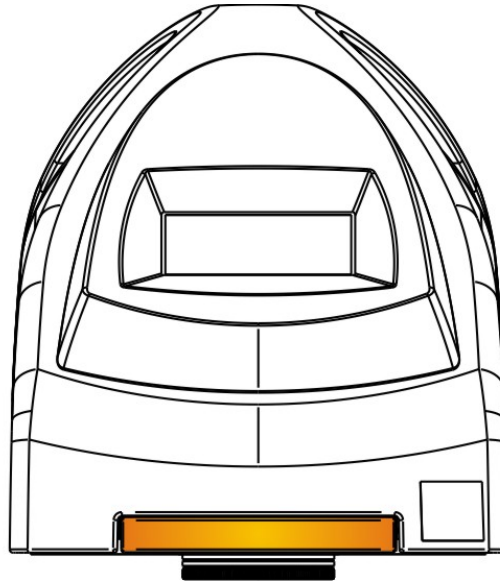


Figure 66: Led bar orange: system ready for marking.

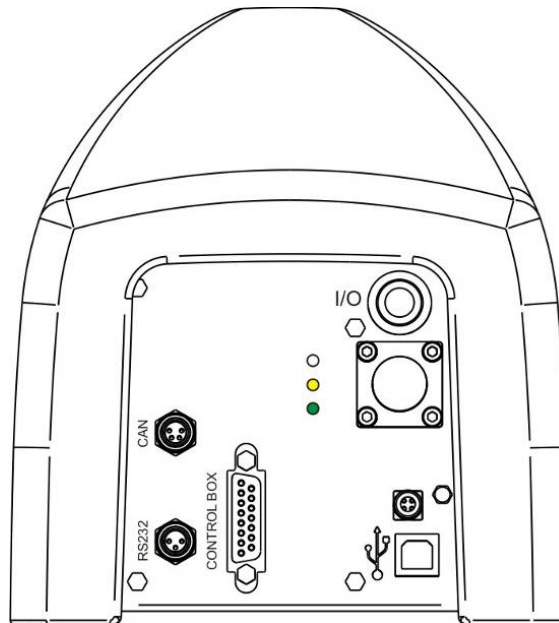


Figure 67: Yellow led indicator on back panel.



NOTE:

In this situation Ulyxe™ can emit LASER.



NOTE:

If aiming and focusing beam laser diodes setup are in automatic mode they'll be light off.

8) if marking operation starts led bar comes red and on display will be showed laser emission status:

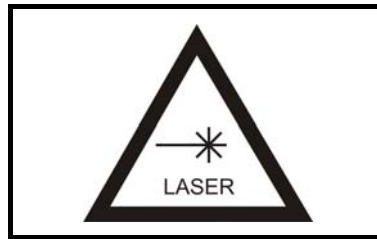


Figure 68: Laser emission.

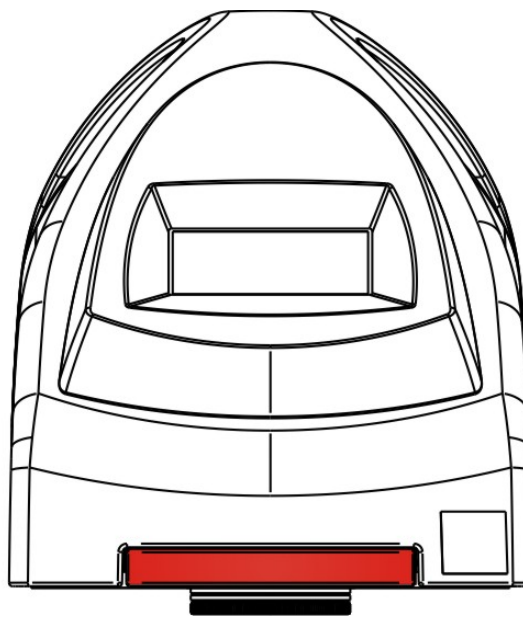


Figure 69: Red led bar: laser emission.

CHAPTER 3

3.2 EXTERNAL CONTROL SIGNAL

To start or stop the current spooler execution externally, two opto-isolated inputs are provided. The start signal is subdue a software confirmation. The DSP board detects a valid external input signal, the DSPapi software module queries the user program to perform the desired action. This behaviour is useful to make some dynamic spooler updates just before the execution starts.

In addition, external system can monitor the laser system status with four open-collector outputs:

- Laser Ready - The spooler is full and software is ready to start.
- Laser Busy - The current spooler is executing (marking in progress).
- Laser End - The current spooler execution is terminated.

3.2.1 TIMINGS I/O

The following diagram illustrates the possible timings and settings of these signals:

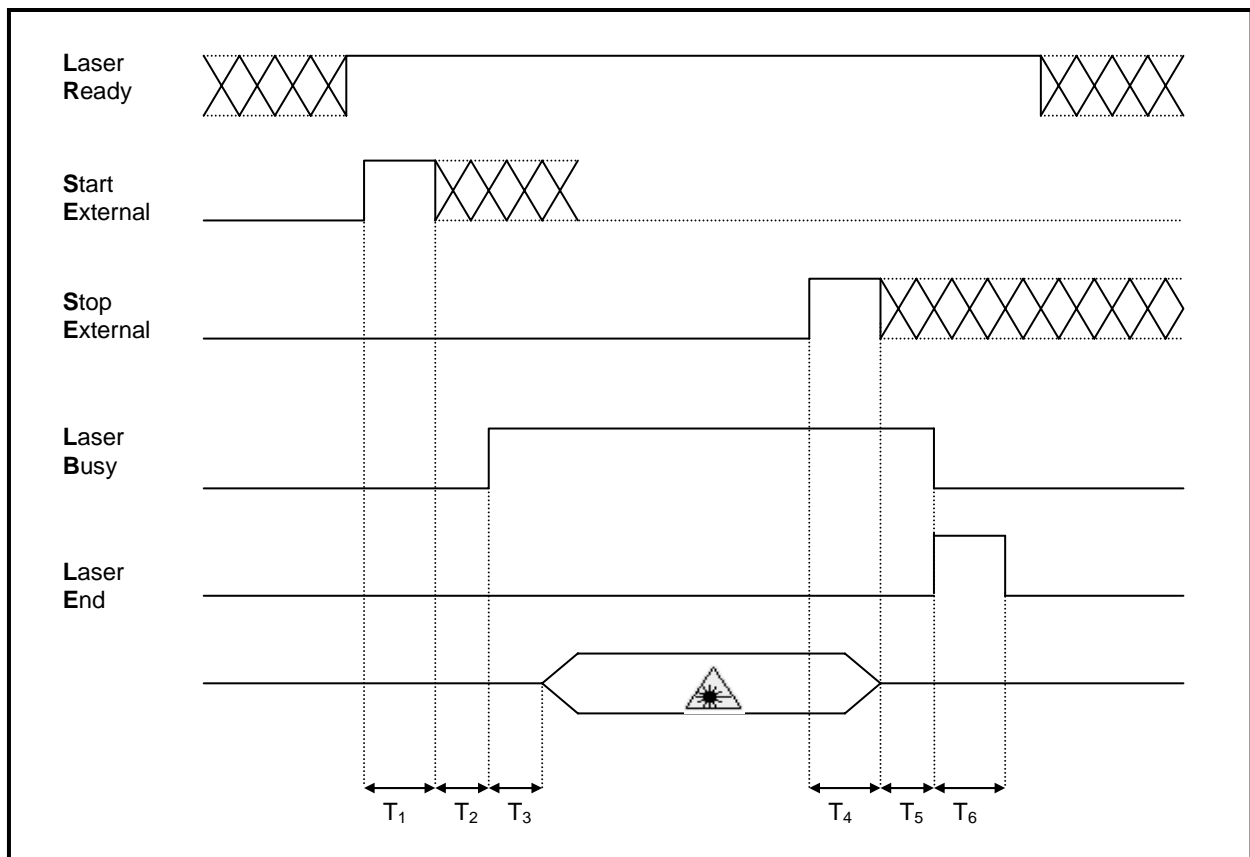


Figure 70: Timing signals.

The time intervals in the diagram can all be programmed by a resolution of 1 ms.

T ₁	Start Time	For setting the minimum acceptable time for the start engraving signal
T ₂	Start Delay	For delaying engraving start
T ₃	Busy Advance	Busy signal corresponding to mark progress
T ₄	Stop Time	The minimum time for stop signal to stop the marking process
T ₅	End Delay	For delaying the Laser End signal with respect to laser emission
T ₆	End Time	For setting the Laser End activation time

3.3 MAINTENANCE

The ordinary maintenance program foresees only. Some operations consist in a mere “check” of the operating condition.

The maintenance activities must be done in respect of law prescriptions regarding the safety rules during the operations.

The following parts/functions have to be controlled:

MAINTENANCE PROGRAM

COMPONENT OR FUNCTION	TYPE OF OPERATION	INTERVALS
Laser Output	Check	Weekly: rub gently with a cloth tampered with acetone or ethyl ether
Fan and heat exchanger unit	Check	Every 6 months (according to the place and frequency of use)

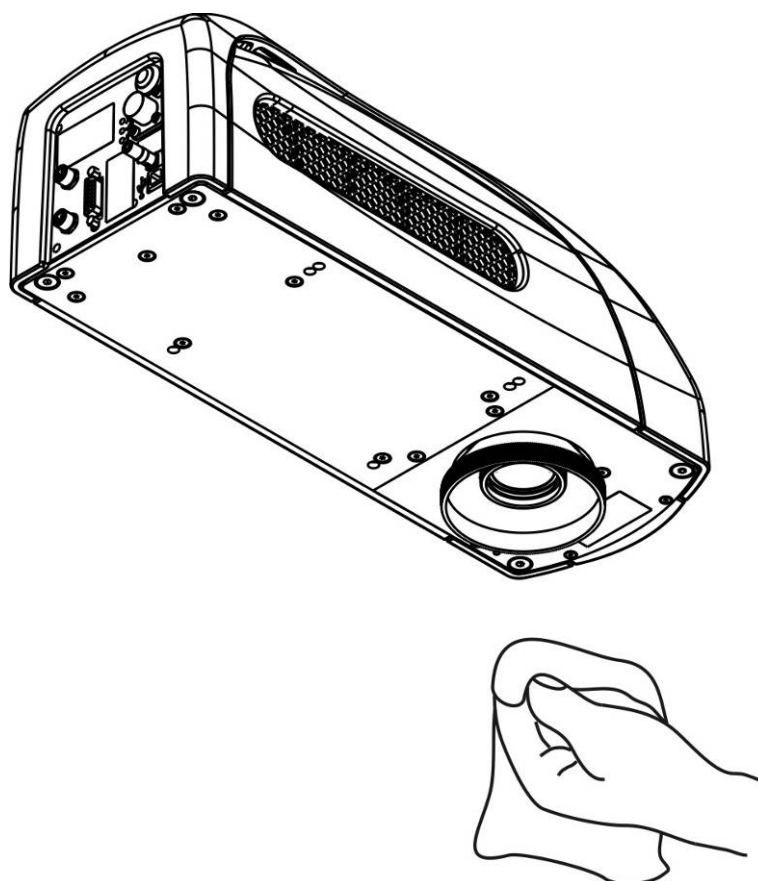


Figure 71: Cleaning laser output.

CHAPTER 3

4 : TECHNICAL SPECIFICATIONS

4.1 ELECTRICAL UNIT

PWM MAIN BOARD

The PWM main board communicates with the various elements of the electrical system, centralizing and sorting operational and management:

- Temperature control; a Peltier cells module is mounted on the base of power laser diode to maintain it to constant temperature.
- Current Driver; manages and controls the current which supplies the laser diode.
- Supply voltages Devices.
- Fan thermally control.
- Aiming Beam.
- Display LCD with CAN bus.
- Shutter control inside resonator.

DSP

The electronics, that controls laser system and the relative signals, consists of a board with DSP processor which has to be connected to a standard PC through an USB cable.

It manages all the operations concerning the marking process; the remote commando from DSP board to scan head are used for scanning of lines, segments (vectors and polygons) and raster images.

Each element to be marked by scan head has to be divided in small lines and segments.

Spooler command is sent from PC to DSP board where a circular double buffer stores the data. After a Start signal, data are converted from digital to analog signals inside DSP board through an integrated DAC. After that they are sent in real time to scanner head.

Q-SWITCH RF DRIVER

The radio frequency driver, driver the electro-optical Q-Switch QS, modulating an output to 40.68 MHz between 15 KHz and 200 KHz, directly based in the command signals received from DSP card by PWM connections.

COOLING FANS

Five fans grants a constant air flow for the cooling of the power laser diode and current driver electronics.

SCAN MARKING HEAD (ON BOARD)

Two inclinable mirrors are mounted inside the scan marking head. They are moved by galvo-motors and controlled by DSP.

I/O INTERFACE

Interfaces control, managing and external/internal status signals generating an insulation between them.

CHAPTER 4

LASER DIODE AND PELTIER CELL

The laser diode is installed in the coupler unit. It is supplied about 2 Vdc low voltage and current up to 30A. It works at a monitored and regulated temperature between 22°C (71,6°F) and 35°C (95°F) and supplies electro-magnetic energy, the so called “optical pumping”, needed to supply the resonator.

AIMING LASER DIODE

The aiming laser diode, supplied with approximately 3,5-4Vdc low voltage, is installed on the resonator unit.

FOCUSING BEAM (OPTIONAL)

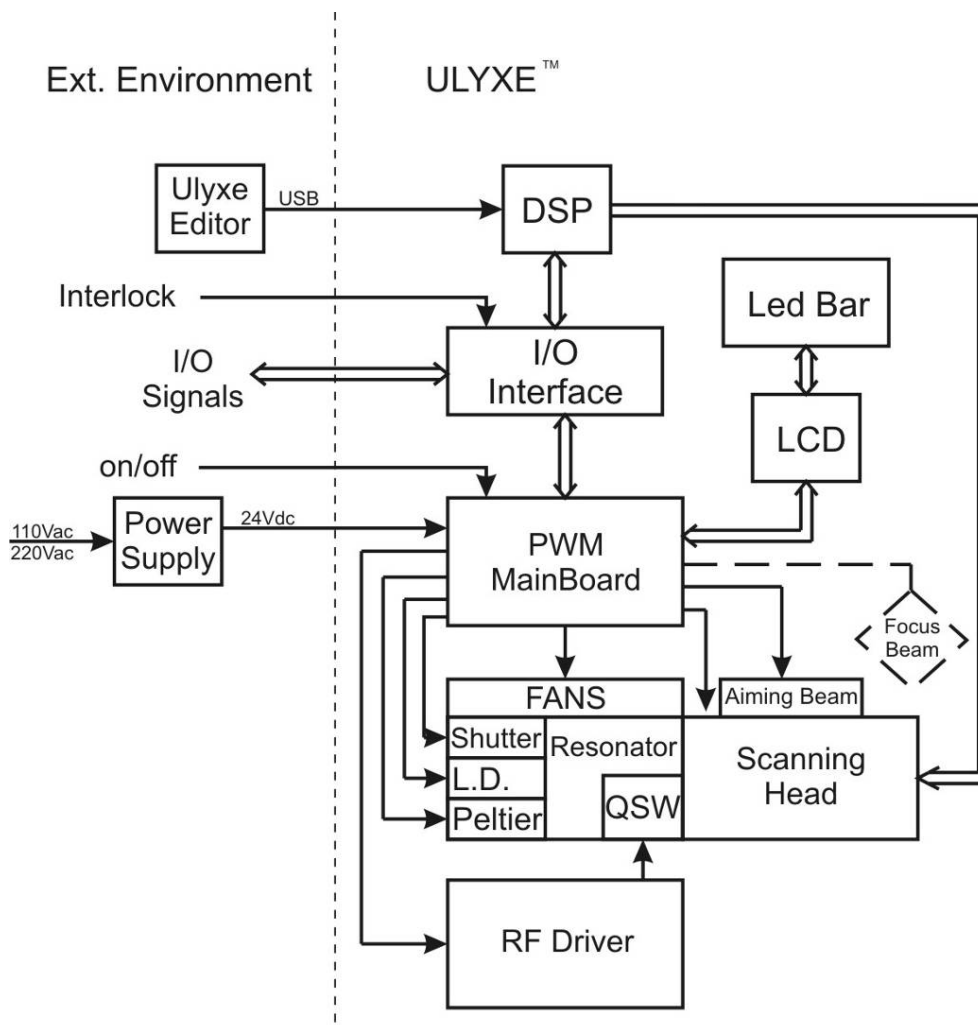
Focusing beam pointer is supplied with approximately 3,5-4Vdc low voltage and it is used to show right focus distance of marking plain. It is located on right side (front view) of scanner head.

DISPLAY (CAN LCD)

Display (make of CMD board with touch screen) provides information on the status of the laser and is the first diagnostic tool in the event of a fault.

Q-SWITCH DEVICE

Q-Switch is an acoustic-optical component located inside the resonator unit. It is an active component, it is directly driven by the radio frequency driver with wave values between 15.000 Hz and 200.000 Hz.



OPTICAL UNIT

The principle of physics that the generation of laser light is based on, is the phenomenon of light stimulated emission. Laser is the acronym of Light Amplification by Stimulated Emission of Radiation. This means that laser is a light amplified by a chain reaction light emission, starting from an initial photon (light particle) which by interacting with the energized atomic system, stimulates the emission of two photons and they in turn interact with other atoms giving rise to a landslide effect.

Energizing the atomic system requires an external energy source, in a suitable form able to start the laser effect. "Optical pumping" is obtained when the light emitted from a luminous sources hits the active material (material able to emit laser light) so that the atoms energize by absorbing luminous energy. Amplification of the laser effect is obtained by making the activated material cross the same light it emits various times.

This is done by placing the material between two opposite mirrors, so crystal and mirrors are centered on an aligned optical axis. The faces of the crystal, the front mirror and the flat face of the rear mirror are parallel. In this optical configuration the extraction of laser energy from the resonator is at the maximum, the beam is circular and the intensity is approximately uniform.

The Q-Switch is a supplementary optical/acoustic-optical device placed between the crystal and front mirror, it oscillates at a fixed frequency or is driven in radio frequency on.

It acts as an "optical switch" preventing the regular and constant flow of photons: when "closed" it is used to increase the energetic level of crystal atomic energizing; when "reopened" the useful energy available output by the resonator is higher than the average value. Once produced, laser radiation can be transferred to any point by optical fiber to a refocalization telescope, using it for a specific application.

In this specific case of laser system, the following information is also of interest.

The optical part is composed of two modules with different functions. The first is the resonator (described above) where the laser light is generated. The second is the scanner head, a module able to deviate the light beam to any point in the work field (previously determined by the selected Lens), which is then used to engrave any two dimensional geometric figure. The special feature of the solid state, Ulyxe™ laser source lies in the optical pumping method of the resonator. Unlike the traditional method, in this case "optical pumping" is effected by a laser diode instead of a flashbulb.

This method is used to obtain an extremely efficient modal and it produces very little heat to be dissipated. These two features make it very easy to significantly reduce the dimensions of the resonator and electrical unit which in this case includes the "pumping" laser diode coupler and its cooling system.

CHAPTER 4

4.2 EXTERNAL CONNECTORS SPECIFICATIONS

4.2.1 POWER SUPPLY PLUG

Panel socket SOURIAU TRIM TRIO 4 ways, cod. UT0010-4SH.

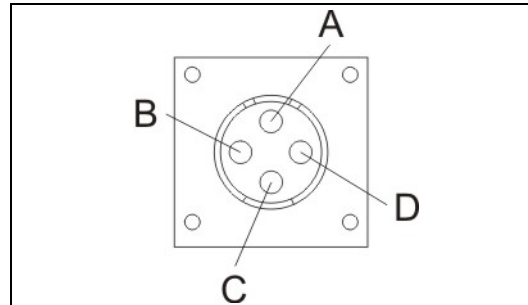


Figure 72: Female panel socket cod. UT0010-4SH (front view).

PIN	SYMBOL	TYPE	DESCRIPTION
A	+24V	Power supply input	Power supply input +24V DC (13A MAX)
B	0V	Power supply input reference	Power supply input reference
C	\perp	Ground - Earth	Earth connection
D	-	-	Not Used

Table: Pin out power supply inlet.

4.2.2 POWER SUPPLY CONNECTOR

Male plug connector SOURIAU TRIM TRIO 4 ways, cod. UT0610-4PH, 3 meter length.

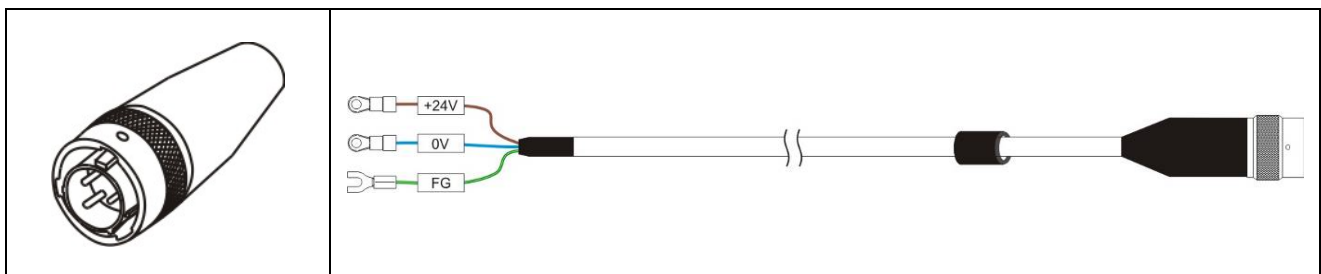


Figure 73: Male plug connector cod. UT0610-4PH (front view) and wiring.

4.2.3 AUX INTERLOCK SOCKET (SW LEVEL)

Panel socket BINDER series 719, 4 ways. Aux Interlock disable Class4 laser source. To restore the machine is necessary restart. For more information see the paragraph "4.4.2 - Error Messages".

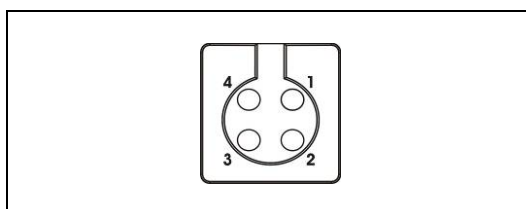


Figure 74: Female panel socket cod. 09-9766-30-04 (front view).



NOTE:

External safety interlock **MUST BE MANAGED** by system integrator.

PIN	SYMBOL	TYPE	DESCRIPTION
1	Vcc	Output power supply	5Vdc output supply
2	INTERLOCK	Digital input	Auxiliary Interlock 5Vdc = Connected; 0Vdc = Disconnected
3	GND	Ground	Ground
4	N.C.	-	Not Used

Table: Pin out aux interlock socket.

4.2.4 AUX INTERLOCK CONNECTOR

Plug connector BINDER series 719, 4 ways

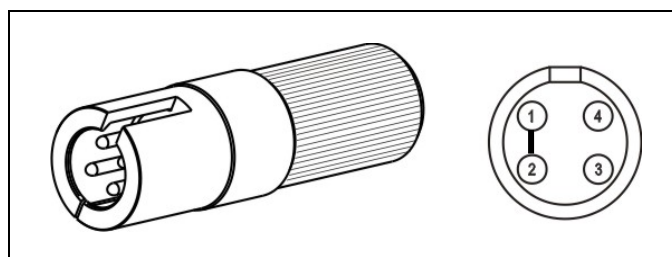


Figure 75: Male plug connector cod. 09-9767-00-04 (front view).



NOTE:

For more information of connection, see the next paragraph "4.2.5 - Signal Key Panel Socket".

CHAPTER 4

4.2.5 SIGNAL KEY PANEL SOCKET (EXTERNAL SAFETIES AND STATUS SIGNALS)

Female panel socket SUB-D 15 ways.

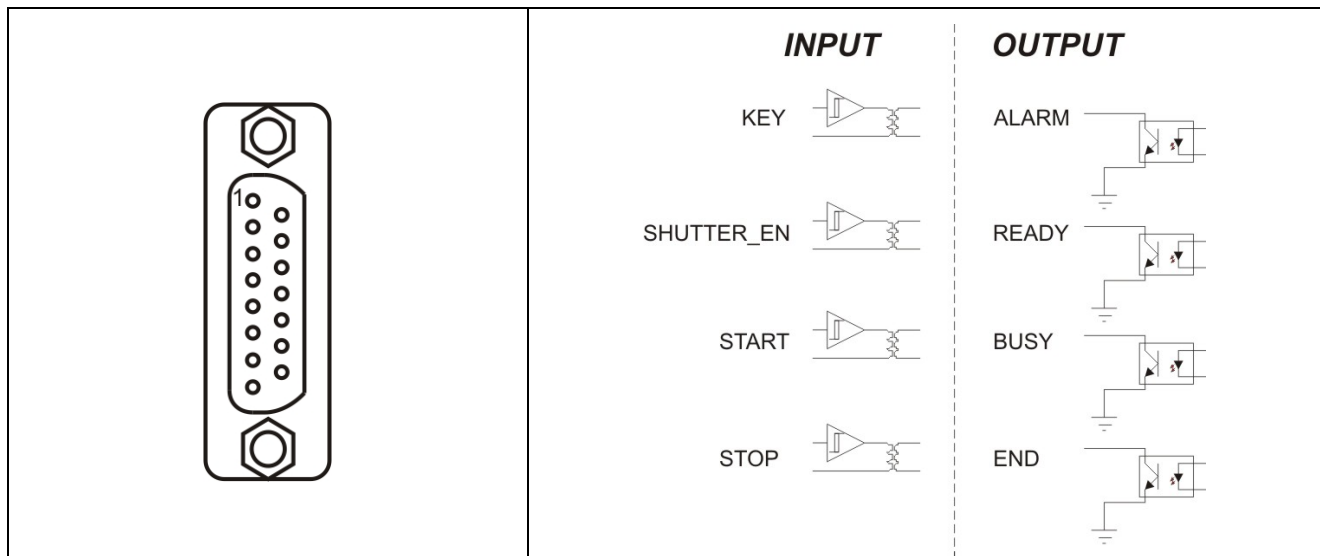


Figure 76: Panel socket (front view) and internal interface.

PI N	SYMBOL	TYPE	DESCRIPTION
1, 2	5VDC	Output power supply	5Vdc output supply (max 200mA)
3	SHUTTER EN	Digital input (5Vdc)	Shutter enable signal (5Vdc = Enabled; 0Vdc = Disabled)
4	START	Digital input (5Vdc)	Start marking external command (5Vdc pulsed signal)
5	STOP	Digital input (5Vdc)	Stop marking external command (5Vdc pulsed signal)
6	READY	Open-collector digital output (max 120mA)	Laser Ready signal (active when system is ready and work mode is ON) Closed = On; Open = Off
7	BUSY	Open-collector digital output (max 120mA)	Laser Busy signal (active during marking) Closed = On; Open = Off
8	END	Open-collector digital output (max 120mA)	End marking signal (active at the end of marking) Closed = On; Open = Off
9	CANPOWER	Output power supply CONTROL BOX EVO DEDICATED	CAN BUS signal dedicated to Control Box EVO
10	KEY	Digital input (5Vdc)	System enable signal (KEY) (5Vdc = System ON; 0Vdc = OFF)
11	CAN_H	Input/Output CONTROL BOX EVO DEDICATED	CAN BUS signal dedicated to Control Box EVO
12	SHUTTER OPEN/ ALARM	Open-collector digital output (max 120mA)	Main alarm signal (active in “ready to mark” status) Closed = System ready; Open = System not ready (Shutter enable OFF or Fault)
13	CAN_L	Input/Output CONTROL BOX EVO DEDICATED	CAN BUS signal dedicated to Control Box EVO
14	CANGND	CAN BUS Ground CONTROL BOX EVO DEDICATED	CAN BUS signal dedicated to Control Box EVO
15	GROUND	Ground	Ground

4.2.6 SIGNAL KEY CONNECTOR (EXTERNAL SAFETIES AND STATUS SIGNALS)

Male connector SUB-D15 ways.

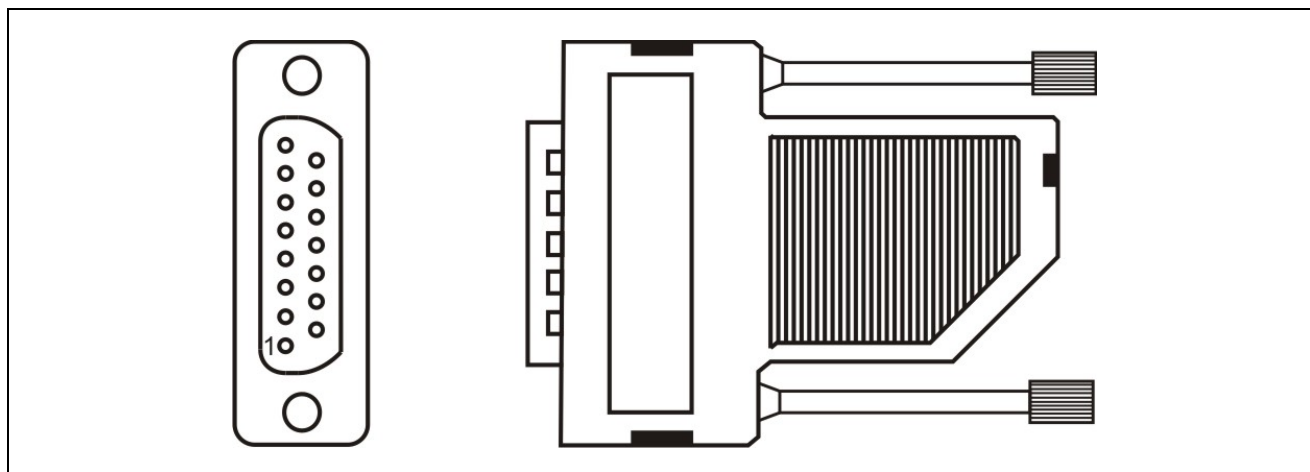


Figure 77: Signal Key male connector.

4.2.7 RS232 CONNECTOR

This connector is used only for service applications (firmware upgrade and debug tool)

4.2.8 CAN CONNECTOR

Not Used

CHAPTER 4

4.3 DISPLAY

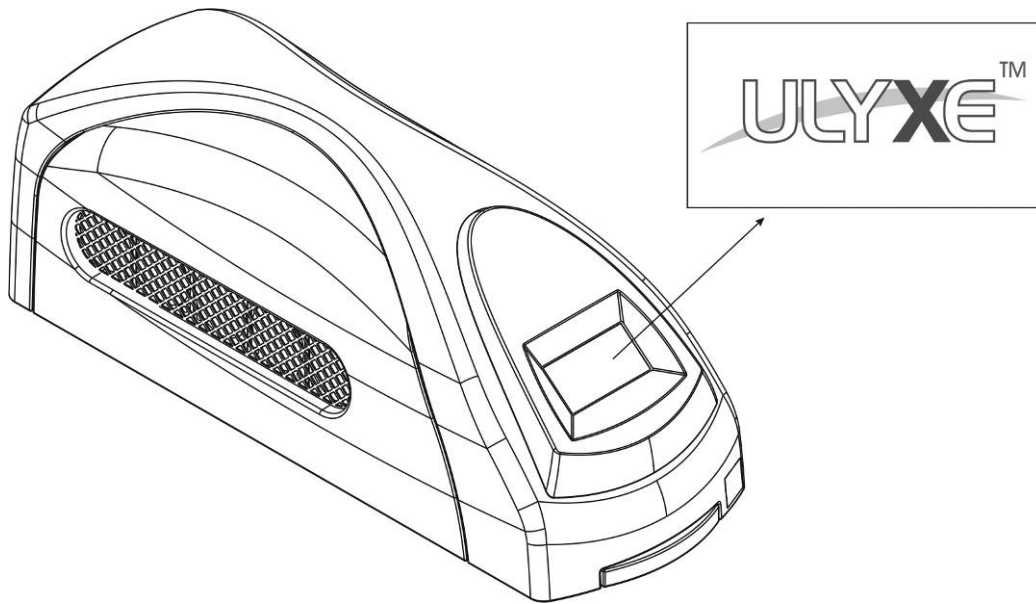


Figure 78: Display Ulyxe™.

Selection areas Touch Screen.

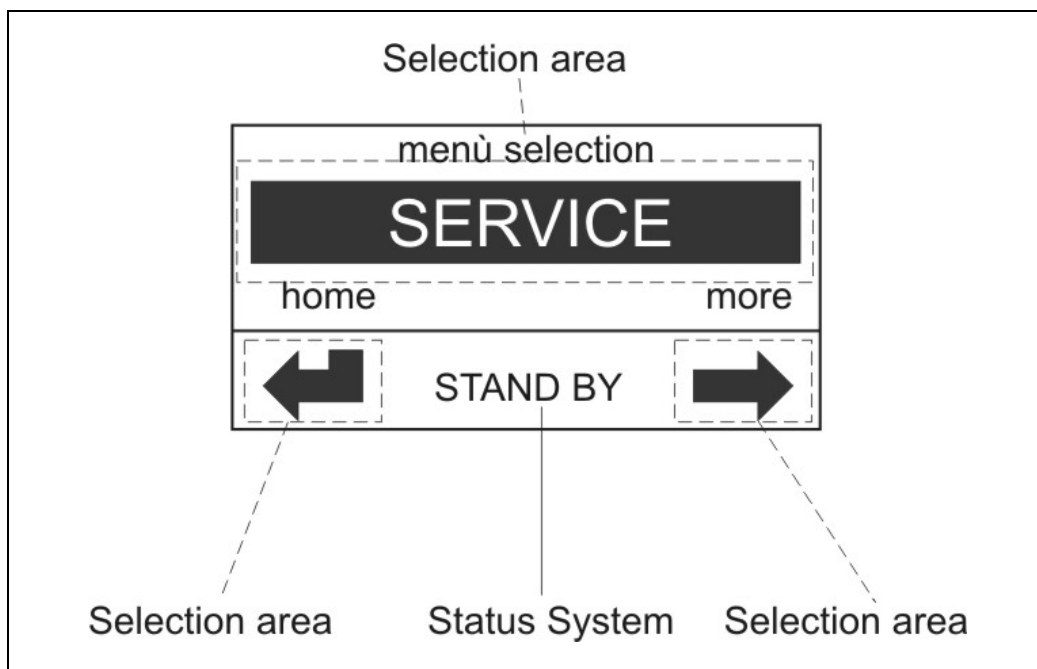


Figure 79: Selection areas Touch Screen.

From display main window where it shows “system ready” it is possible to access a menu list with more options to select and view as showed in figure.

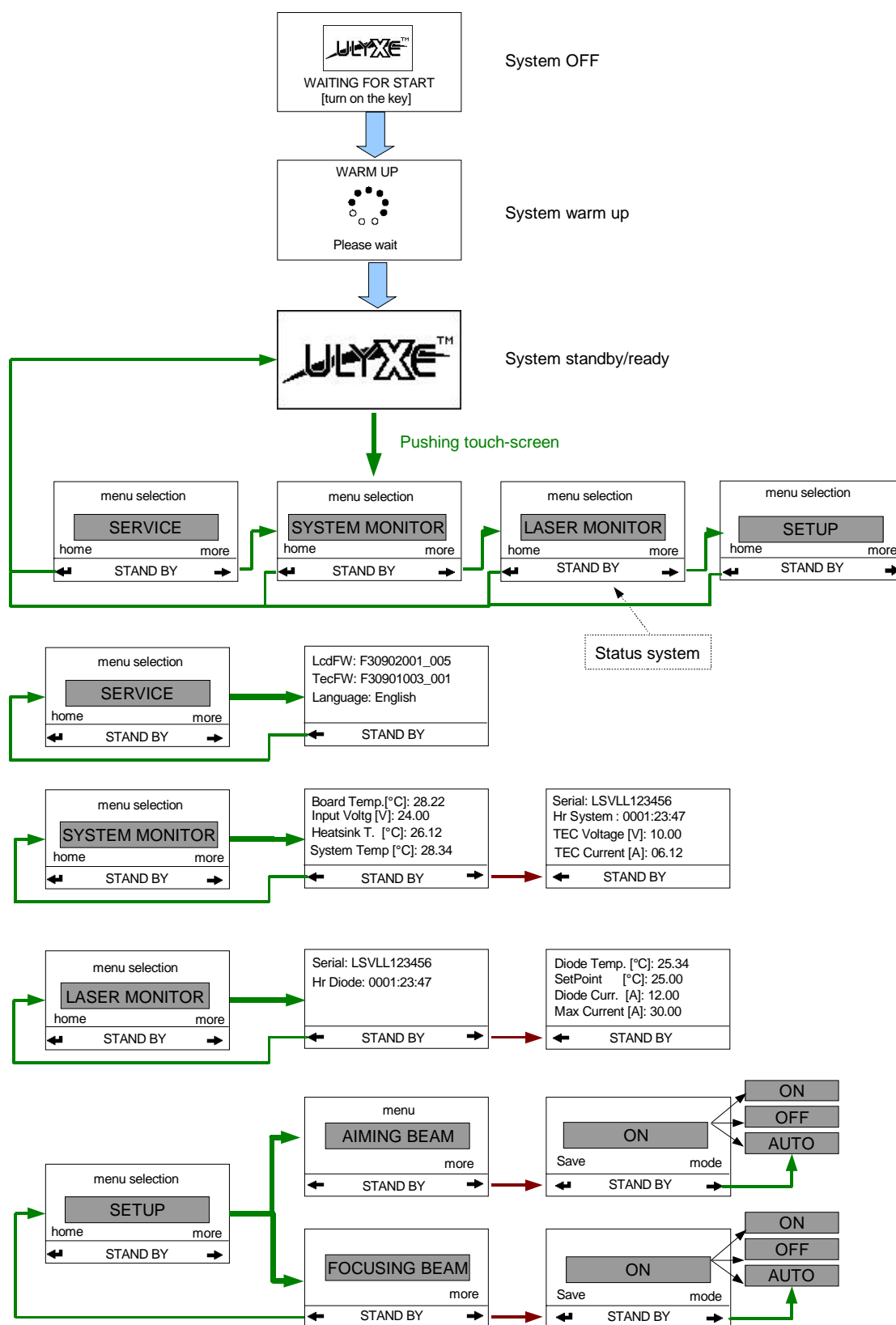


Figure 80: Display Touch screen menu.

CHAPTER 4

<div> <div>menu selection</div> <div>SERVICE</div> <div>home more</div> <div>STAND BY</div> </div>	<p>Selection menu to display general SERVICE.</p> <ul style="list-style-type: none"> Press the middle area to select it and display the information. Press the bottom left arrow to return to the main screen with the ULYXE™ logo. Press the bottom right arrow to access the next selection menu.
<div> <div>menu selection</div> <div>SYSTEM MONITOR</div> <div>home more</div> <div>STAND BY</div> </div>	<p>Selection menu to display SYSTEM MONITOR.</p> <ul style="list-style-type: none"> Press the middle area to select it and display the data. Press the bottom left arrow to return to the main screen with the ULYXE™ logo. Press the bottom right arrow to access the next selection menu.
<div> <div>menu selection</div> <div>LASER MONITOR</div> <div>home more</div> <div>STAND BY</div> </div>	<p>Selection menu to display LASER MONITOR.</p> <ul style="list-style-type: none"> Press the middle area to select it and display the data. Press the bottom left arrow to return to the main screen with the ULYXE™ logo. Press the bottom right arrow to access the next selection menu.
<div> <div>menu selection</div> <div>SETUP</div> <div>home more</div> <div>STAND BY</div> </div>	<p>Selection menu to display the SETUP.</p> <ul style="list-style-type: none"> Press the middle area to select it and display the settings. Press the bottom left arrow to return to the main screen with the ULYXE™ logo. Press the bottom right arrow to access the next selection menu.
<div> <div>LcdFW: F30902001_006</div> <div>TecFW: F30901003_002</div> <div>Language: English</div> <div>STAND BY</div> </div>	<p>Data contained in the SERVICE menu.</p> <ul style="list-style-type: none"> LcdFW: FW version of the LCD card. TecFW: FW version of the power mainboard. Language: language automatically selected through the setting on ULYXE Editor. If the language is not recognized, it is set on English. Press the bottom left arrow to return to the main screen with the ULYXE™ logo.
<div> <div>Board Temp.[°C]: 28.22</div> <div>Input Voltg [V]: 24.00</div> <div>Heatsink T. [°C]: 26.12</div> <div>System Temp [°C]: 28.34</div> <div>STAND BY</div> </div>	<p>Information contained in the SYSTEM MONITOR menu (1 of 2).</p> <ul style="list-style-type: none"> Board Temp. [°C]: Temperature of the mainboard for the power section. Input Voltage [V]: Input power voltage measured on the mainboard. Heatsink T. [°C]: Central heatsink temperature. System Temp. [°C]: Environment temperature measured inside the system (at the cooling fans inlet). Press the bottom left arrow to return to the main screen with the ULYXE™ logo. Press the bottom right arrow to access the following information.
<div> <div>Serial: LSVLL123456</div> <div>Hr System : 0001:23:47</div> <div>TEC Voltage [V]: 10.00</div> <div>TEC Current [A]: 06.12</div> <div>STAND BY</div> </div>	<p>Information contained in the SYSTEM MONITOR menu (2 of 2).</p> <ul style="list-style-type: none"> Serial: System serial number, visible on the outside label too. Hr System: Total time elapsed with system in operation [hhhh:mm:ss] TEC voltage [V]: Voltage on the Peltier module TEC Current [A]: Current on the Peltier module Press the bottom left arrow to return to the main screen with the ULYXE™ logo.

<div> Serial: LSVLL123456 Hr Diode: 0001:23:47 </div> <div> ← STAND BY → </div>	<p>Information contained in the LASER MONITOR menu (1 of 2).</p> <ul style="list-style-type: none"> Serial: Laser Diode serial number. Hr Diode: Total time elapsed with laser diode in emission [hhhh:mm:ss] Press the bottom left arrow to return to the main screen with the ULYXE™ logo. Press the bottom right arrow to access the following information.
<div> Diode Temp. [°C]: 25.34 SetPoint [°C]: 25.00 Diode Curr. [A]: 12.00 Max Current [A]: 30.00 </div> <div> ← STAND BY → </div>	<p>Information contained in the LASER MONITOR menu (2 of 2).</p> <ul style="list-style-type: none"> Diode Temp. [°C]: Temperature measured on the laser diode SetPoint [°C]: Set-point temperature of the laser diode Diode Current [A]: Current measured on the laser diode Max current [A]: Max. admissible current on the laser diode Press the bottom left arrow to return to the main screen with the ULYXE™ logo.
<div> menu </div> <div> AIMING BEAM </div> <div> ← STAND BY → </div>	<p>Selection menu to set the aiming laser diode.</p> <ul style="list-style-type: none"> Press the middle area to select it and display the settings. Press the bottom left arrow to return to the main screen with the ULYXE™ logo. Press the bottom right arrow to switch to the focusing diode.
<div> ON </div> <div> Save mode </div> <div> ← STAND BY → </div>	<p>Selection menu to set the red diode.</p> <ul style="list-style-type: none"> Press the bottom left arrow to confirm the setting and return to the main screen with the ULYXE™ logo. Press the bottom right arrow to change the operating mode (ON/OFF/AUTO). <p>ON: always on; OFF: always off; AUTO: on when system is in stand-by status.</p>
<div> FOCUSING BEAM </div> <div> more </div> <div> ← STAND BY → </div>	<p>Selection menu to set the focusing diode.</p> <ul style="list-style-type: none"> Press the middle area to select it and display the settings. Press the bottom left arrow to return to the main screen with the ULYXE™ logo. Press the bottom right arrow to switch to the pointer diode.

CHAPTER 4

4.4 TROUBLESHOOTING

Problems may occur while the machine is in operation due to malfunctions or simple oversights. In both cases, the display will show messages referred to the type of problem detected. In case of Hardware error, Ulyxe™ shuts off automatically without signaling the error. Power off the device upstream before you perform any recovery operation.

The operating limits of Ulyxe™ are subdivided into hardware values and software values. If a software limit is reached, the machine stays on, the power section is turned off and an error message is displayed. If a hardware limit is reached, the machine goes into a protection status and shuts off automatically. In this case, the type of error can be identified only if the malfunction is listed in the following table.

	SW LIMIT	HW LIMIT
Laser diode MAX temperature	35°C	40°C
Laser diode MIN temperature	10°C	--
Heat sink MAX temperature	60°C	--
Converter MAX temperature	65°C	72°C
MAX environment temperature	40°C	45°C
MIN environment temperature	10°C	0°C
Laser diode MAX current	25A - 31A	38.5V
Laser diode MAX voltage	2.5V	3.5V
Peltier module MAX current	12A	15A
MIN input voltage	22,5V	--

4.4.1 LIST OF POSSIBLE MALFUNCTIONS

STATUS	CAUSE	ACTION
Red LED bar blinking	An internal error has occurred and the system is in software protection mode	Check the error message shown on the display and refer to paragraph 4.4.2 for the recovery procedures
Orange LED bar blinking	Warning status. The display shows "DISABLE SHUTTER" because start sequence is wrong	<p>If the machine was powered on with the signal <i>enable shutter</i> active disable it. Ulyxe™ will automatically go into stand-by mode if the <i>key</i> signal is activated, otherwise into system-off status</p> <p>If <i>enable shutter</i> is already disabled: Ulyxe™ does not supply external power onto I/O connector (control box). Make sure that there is 5Vdc voltage between pin 1 and pin 15 of connector DB15. If there is, make sure the command signals are connected and in compliance. If there is no voltage, call technical assistance</p>
Green LED bar blinking	The machine is in <i>warm-up</i> mode because the <i>key</i> command has been enabled	Wait for the pre-heating phase to finish before carrying out any other operation
ALARM output signal in OFF mode	The machine is not in Ready mode	Put the machine in Ready mode. Contact technical assistance if the problem persists

The machine turns off when powered on	The machine goes into hardware protection mode because a parameter does not comply with specifications	Check compliance with the stated specifications (input voltage, environment temperature, etc.) Cut off power supply to the Ulyxe™ and wait 30/60 minutes before restarting. Contact technical assistance if the problem persists
The machine turns off after turning the key	The machine goes into hardware protection mode due to a protection in the power system	Check compliance with the stated specifications (laser diode temperature and current, etc.) Cut off power supply to the Ulyxe™ and wait 30/60 minutes before turning it back on. Contact technical assistance if the problem persists
The machine turns off during regular operation	The machine goes into hardware protection mode due to a system malfunction	Make sure the aux interlock connector is present. Cut off power supply to the Ulyxe™ and turn it back on Check compliance with the stated specifications (input voltage, environment temperature, etc.) Cut off power supply to the Ulyxe™ externally and wait 30/60 minutes before restarting. Contact technical assistance if the problem persists
The USB connection is not working	No connection between PC and ULYXE™	Make sure the right Ulyxe™ USB driver as well as the connection cable are present. Please refer to section “ <i>INFORMATION ABOUT USB 2.0</i> ” for additional info
The LCD does not work	No power on the display	Make sure the machine is turned on. Contact technical assistance if the problem persists
The machine does not turn on	The input power is not right or the internal board is broken	Make sure the <i>Reverse Voltage</i> back panel LED is active and exchange the power supply cable pins because they are reversed. Contact technical assistance if the problem persists
Laser beam emitted with shutter open with no emission commands	The internal RF Q-switch may be damaged or misaligned, or its RF driver is not working properly	Check to see if you can solve the problem decreasing thermalization value on Ulyxe Editor laser settings. Contact technical assistance if the problem persists
The laser beam and the pointer one do not move correctly during emission	The laser beam galvo mirrors are not driven correctly due to internal damage	Contact technical assistance if the problem persists

CHAPTER 4

4.4.2 ERROR MESSAGES







ERROR MESSAGE	CAUSE	ACTIONS
<div> DIODE MAX CURRENT FAULT SHUT DOWN AND RESTART </div>	The laser diode max current software level was exceeded. The value is displayed in the Max. Current field in the LASER DATA section.	Turn off, wait 30/60 minutes and restart. Read the value displayed in the <i>Diode Current</i> field in the LASER MONITOR section and check to see if it exceeds the Max. Current value. In case the problem occurs, carry out the data log with the service tool and contact technical assistance.
<div> DIODE HIGH TEMP FAULT SHUT DOWN AND RESTART </div>	The laser diode max temperature software level was exceeded. The value is set at 35°C. The system cuts off the current on the diode and tries to bring the laser diode to the proper temperature.	Turn off, wait 30/60 minutes and restart. Make sure that the cooling fans unit is working properly and that the fans are not obstructed in any way. Read the value displayed in the <i>Diode Temp.</i> field in the LASER MONITOR section and check to see if it deviates from the Set-point value. In case the problem occurs, carry out the data log with the service tool and contact technical assistance.
<div> DIODE LOW TEMP FAULT SHUT DOWN AND RESTART </div>	The laser diode temperature has fallen below the minimum temperature software level. The value is set at 10°C. The system turns off the entire power section (laser diode, Peltier module, RF driver, etc.) since the laser diode temperature controller is out of control.	Turn off, wait 30/60 minutes and restart. Make sure the room temperature complies with the specifications. Read the value displayed in the <i>Diode Temp.</i> field in the LASER MONITOR section and checks to see if it deviates from the Set-point value. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.
<div> DIODE OUTPUT PROTECTION SHUT DOWN AND RESTART </div>	The laser diode voltage software level was exceeded. The value is set at 2.5V. The system turns off the entire power section (laser diode, Peltier module, RF driver, etc.) since the laser diode may be broken, its contacts not connected properly or the internal card malfunctioning.	Turn off, wait 30/60 minutes and restart. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.
<div> TEC CURRENT FAULT SHUT DOWN AND RESTART </div>	The Peltier module current software level was exceeded. The value is set at 12A. The system turns off the entire power section (laser diode, Peltier module, RF driver, etc.) since the Peltier module may be broken, its contacts not connected properly or the internal card malfunctioning.	Turn off, wait 30/60 minutes and restart. Read the value displayed in the <i>TEC Current</i> field in the SYSTEM MONITOR section. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.

<div> <div>TEC OUTPUT VOLTAGE FAULT</div> <div>SHUT DOWN AND RESTART</div> </div>	<p>The Peltier module voltage software level was exceeded. The value is set at 10V and it is displayed in the <i>TEC Voltage</i> field in the SYSTEM DATA section. The system turns off the entire power section (laser diode, Peltier module, RF driver, etc.) since the internal card is malfunctioning.</p>	<p>Turn off, wait 30/60 minutes and restart. Read the value displayed in the <i>TEC Voltage</i> field in the SYSTEM MONITOR section. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.</p>
<div> <div>PWM CARD TEMPERATURE FAULT</div> <div>SHUT DOWN AND RESTART</div> </div>	<p>The temperature software level on the power section of the internal card was exceeded. The value is set at 65 . The system turns off the entire power section (laser diode, Peltier module, RF driver, etc.) since the internal heat cannot be dissipated. The problem may be caused by critical environmental conditions (high outside temperature, insufficient air flowing into the fans, etc.) or the internal dissipation is not efficient (poor thermal contact between the internal devices).</p>	<p>Turn off, wait 30/60 minutes and restart. Make sure the environmental conditions comply with specifications. Read the value displayed in the <i>Card Temp.</i> field in the SYSTEM MONITOR section, checking to see if it quickly reaches 65°C. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.</p>
<div> <div>HEAT SINK HIGH TEMP FAULT</div> <div>SHUT DOWN AND RESTART</div> </div>	<p>The temperature software level on the central heat sink was exceeded. The value is set at 60°C. The system turns off the entire power section (laser diode, Peltier module, RF driver, etc.) since the internal heat cannot be dissipated. The problem may be caused by critical environmental conditions (high outside temperature, insufficient air flowing into the fans, etc.) or by a malfunction of the cooling fans.</p>	<p>Turn off, wait 30/60 minutes and restart. Make sure the environmental conditions comply with specifications. Read the value displayed in the <i>Heat sink T.</i> field in the SYSTEM MONITOR section, checking to see if it quickly reaches 60°C. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.</p>
<div> <div>SYSTEM HIGH TEMP FAULT</div> <div>SHUT DOWN AND RESTART</div> </div>	<p>The environment temperature software level was exceeded. The value is set at 40° C. The system turns off the entire power section (laser diode, Peltier module, RF driver, etc.) since the internal heat cannot be dissipated.</p>	<p>Turn off Ulyxe™ and make sure the environment temperature complies with the specifications before you turn it back on. Read the value displayed in the <i>System Temp.</i> field in the SYSTEM MONITOR section, checking to see if it is near the 40°C limit. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.</p>
<div> <div>SYSTEM LOW TEMP FAULT</div> </div>	<p>The environment temperature has fallen below the minimum temperature software level. The value is set at 10°C. The system turns off the entire power section (laser diode, Peltier module, RF driver, etc.) since there is a risk of damaging the optical parts. Fans are maintained ON to try to back to right temperature the system device.</p>	<p>Turn off and make sure the environment temperature complies with the specifications before you turn it back on. If it is first installation wait 30/60 minutes until turn on again. Read the value displayed in the <i>System Temp.</i> field in the SYSTEM MONITOR section, checking to see if it is near the 10°C limit. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.</p>

CHAPTER 4

<div>INTERLOCK DISCONNECTED</div> <div>SHUT DOWN AND RESTART</div>	<p>The aux interlock connector or its closed contact is not present upon turning on the system. The entire internal electronics is disabled.</p>	<p>Turn off and restore the aux interlock connector before you restart the device. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.</p>
<div>SHUTTER FAULT</div> <div>SHUT DOWN AND RESTART</div>	<p>The internal shutter does not work properly. Its position is wrong. The system turns off the entire power section (laser diode, Peltier module, RF driver, etc.) since the system may emit an unwanted laser beam. The problem may be caused by a malfunction of the shutter or of its position sensor, or the internal card may be malfunctioning.</p>	<p>Turn off, wait 30/60 minutes and restart. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.</p>
<div>DISABLE SHUTTER</div>	<p>A wrong power on sequence was carried out. The system was started with the <i>enable shutter</i> active.</p>	<p>Disable the enable shutter signal and the system will return to its proper operating status. In case the shutter is not disabled, contact technical assistance.</p>
<div>CAN CONNECTION ERROR</div>	<p>The CAN communication between the internal cards is not working properly. The problem may be caused by an internal connection or a damaged internal device.</p>	<p>Turn off and restart. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.</p>
<div>LOW VOLTAGE INPUT</div> <div>SHUT DOWN AND RESTART</div>	<p>The inlet power voltage has fallen below the minimum voltage software level. The value is set at 20Vdc. The entire internal electronics is disabled.</p>	<p>Turn off and restore the power voltage to 24Vdc before you restart. Read the value displayed in the <i>Input Voltage</i> filed in the SYSTEM MONITOR section, making sure that the value displayed is around 24Vdc. In case the problem re-occurs, carry out the data log with the service tool and contact technical assistance.</p>

APPENDIX A : LABELS IDENTIFICATION

LABEL	DESCRIPTION
	Identification label
	Warning Logotype
	Laser labels *
	Label for panels
	Aperture label
	USB plug
I/O	Power ON switch
RS232	Serial communication
CAN	CanBus communication
CONTROL BOX	Control box connector
AUX INTERLOCK	Auxiliary interlock connector

* Maximum output of laser radiation as per definition 3.55 of IEC60825-1 considering single fault conditions.

APPENDIX A

EXTERNAL LABELS LOCATION

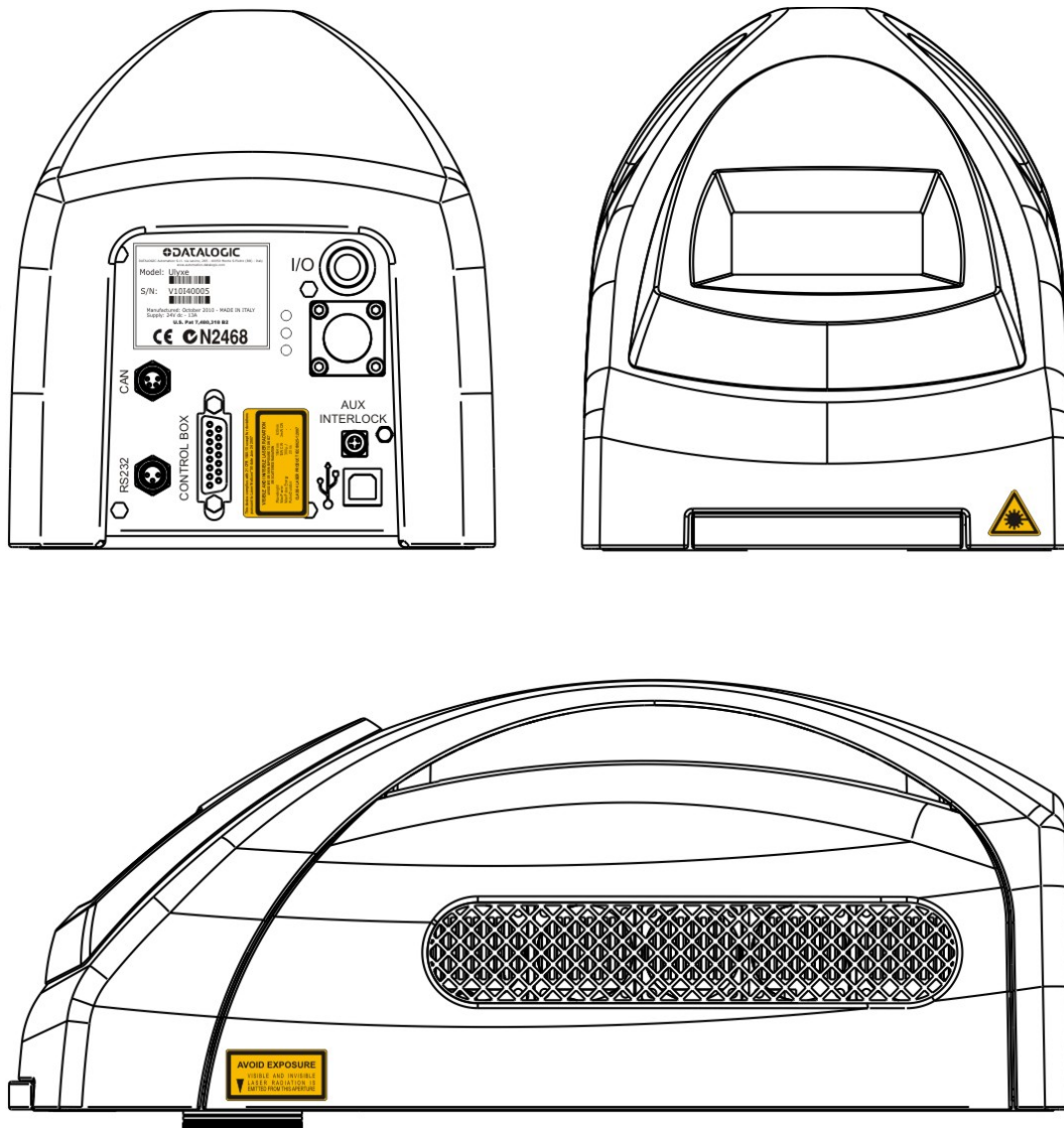


Figure 81: External labels location.

INTERNAL LABELS LOCATION

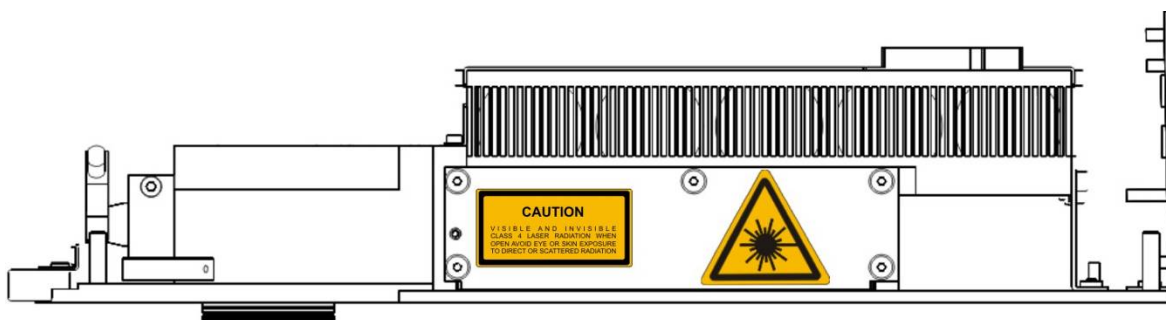


Figure 82: Internal labels location.

APPENDIX B: STANDARDS

LASER STANDARDS

Ulyxe™ is designed to comply with the applicable sections of these laser standards:

EU : EN60825-1

USA : 21 CFR 1040.10

Ulyxe™ is classified as Class 4 Laser Product.

Datalogic Automation S.r.l., as manufacturer of "Ulyxe™" laser sources, provides a laser device which is NOT intended for immediate use, but it must be connected, by others, to other devices which have the final aim of creating a laser processing system.

The system manufacturer MUST ensure the safety of the laser processing machine according to its standards including the risk-analysis, implementation of safety measures, certification and testing of safety measures and the production of adequate information for use of the machine.

Datalogic Automation S.r.l. is available for providing to the system integrator/OEM all the information in its possession to help in complying with applicable standards

CE COMPLIANCE

See Declaration of Conformity.



WARNING!

This is a Class A product. In a Class B environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC COMPLIANCE

Modifications or changes to this equipment without the expressed written approval of Datalogic could void the authority to use the equipment.

This device complies with PART 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference which may cause undesired operation.

This equipment has been tested and found to Comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

APPENDIX C

APPENDIX C: GUIDE FOR SYSTEM INTEGRATOR

Ulyxe is classified as Class 4 Laser product. It is intended to be installed in a system by system integrator/OEMs that they have the final responsibility of Classification of their end product.

Final system MUST comply with all requirements in order that the system will be classified as

- CLASS 1 LASER PRODUCT if end user could be exposed to a radiation not exceed the AEL for Class 1 during marking operation (1064nm)
- CLASS 2 LASER PRODUCT if end user is not exposed to a radiation during marking but could be exposed to the radiation not exceeding the AEL for Class 2 during focusing and aiming (635nm)

Ulyxe is designed to easily fulfil all the requirement as per EU/USA standards.

Below a YES/NO table for features of Class 4 Laser. A "NO" in the Ulyxe column means that the feature is available through dedicated connector and MUST be completely implemented by the system integrator/OEM.

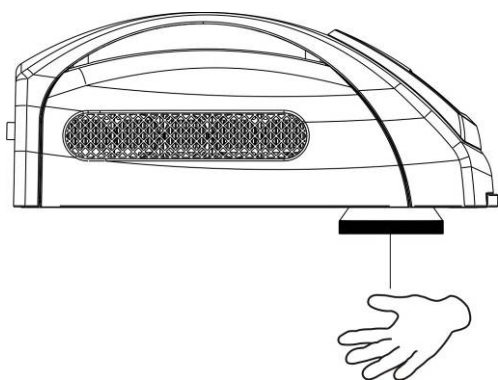
FEATURE	LOCATION/DESCRIPTION	required by USA STANDARDS	required by EU STANDARDS	Provided on Ulyxe
KEYSWITCH	Control Panel On/Off key switch controls power to laser electronics. Key can not be removed from switch in "On" position	YES	YES	NO
SHUTTER FUNCTION	Laser Control Functions as beam attenuator to disable current driver/laser output when closed	YES	YES	YES
READY INDICATOR	Panel Indicator (YELLOW) Indicates that the laser has power applied and is capable of lasing	YES	YES	YES
LASER ON INDICATOR	Panel Indicator (RED) Indicates that laser is actively lasing	YES	YES	YES
FIVE SECOND DELAY	Laser Circuit Element Disable current driver/laser output for 5s after key switch is turned to "ON" or remote reset/restart is applied when key switch is in "On" position	YES	NO	YES
Power Fail Lockout	Laser circuit element Disable current driver/laser output if input power is removed then later reapplied (AC or DC power supply failure or remote aux interlock actuation) while key switch is in "ON" position	YES	NO	YES
Remote Interlock	Panel connection Disables current driver/laser output when a remote interlock switch on an equipment door or panel is opened	YES	YES	NO
Warning Label	External / Internal	YES	YES	YES*

* Ulyxe labels comply with Class 4 Laser Product Requirement. The labels to be used in the machine where Ulyxe is installed MUST comply with the requirements for the Laser Class of the machine itself.

APPENDIX D: NOTE ABOUT LASER

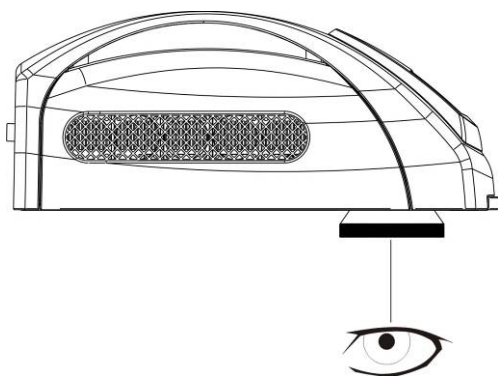
LASER SAFETY

The following information is provided to comply with the rules imposed by International Authorities and refers to the correct use of Ulyxe™.



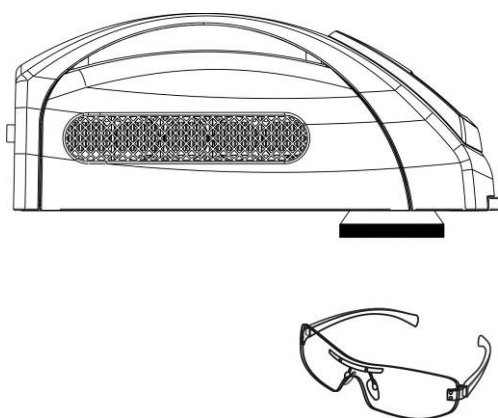
NOTE:

The device is a Class 4 laser product. Visible and invisible laser radiation can be diffused. Avoid skin exposure to direct or reflected radiation.



NOTE:

Direct vision of a laser beam may cause irreversible damage to eyes.



NOTE:

Wear protection glasses while using the device!



NOTE:

BEFORE INSTALLING AND USING THE LASER, READ CAREFULLY THE APPENDIX CONCERNING LASER SAFETY.

APPENDIX D

LASER RADIATION

Laser radiation is an electromagnetic emission with a micrometric wave length which ranges from the long infrared (CO2 Laser), close infrared (Laser Nd:Yag, Nd:YVO4), visible (Laser He:Ne or Argon) and ultraviolet (excimer laser).

It should be considered non-Ionizing Radiation. In Ulyxe™ Lasers, the emission of a crystal bar is stimulated by “optical pumping” generated by a Diode Laser. The continuous reflection of Photons, between a front mirror and rear mirror, creates a positive reaction so that their number continues to increase, until reaching the concentration necessary to produce a beam which projects from the semi-reflecting front mirror. The radiation (which we can imagine as a “Beam of invisible light”) is then Collimated and Focalized with Lenses at a point where the intensity becomes high enough to be able to react with various materials producing an alteration in them due to thermal effect.

The radiation of Ulyxe™ Lasers is invisible, but since it is near the threshold of visibility, the Eye receives it almost in its entirety without using the natural defense provided by pupil reflex! Added to this is the fact that it is generally very intense, with the result that it can be very harmful to the eye and present vision problems.



NOTE:

Directly viewing a Laser beam **can cause irreversible damage** to vision.

To prevent permanent damage to vision, a few precautions must be taken.

All individuals who may be exposed to dangerous levels of laser radiation, must know that the laser is active and wear protective goggles if necessary.

Due to its high power, the laser integrated in the Datalogic Automation system provokes reflected laser light from flat surfaces. Reflected light is potentially dangerous for the eyes and skin. Electromagnetic emission with a micrometric wave length is placed in long infrared, and is therefore invisible, thus it is not clear where reflected beams are aimed.



NOTE:

It is indispensable to protect yourself from reflected light beams, because they can be sufficiently intense to create permanent injury to the eyes or skin.

In addition to possible injury to the eyes or skin, direct laser emission can cause flammable materials to burn like organic solvents (alcohol, acetone) or gasoline and cause fabric and clothing to burn.



NOTE:

This laser is classified as **class 4**. Class 4 includes lasers which can produce risks, not only from **direct** or **reflected** radiation, but also from **scattered** radiation! The laser sources may be a significant risk for the skin and risk of burning flammable materials.

ABSORPTION OF LASER RADIATION

Human skin absorbs electromagnetic radiation in different ways depending on the wave length of the radiation. Both the eye and skin have a “predisposition” for accepting certain wave lengths, and are more unresponsive to absorbing others. In the specific case of the Eye, the Cornea and Crystalline lens let all the wave lengths from 400 to 1400 nm pass and reach the Retina, even with various attenuations. They include the range from visible light to IRA infrared. Thus Nd:YVO₄ laser radiation (1064 nm wavelength) is included in this range and **leads to direct Retina exposure!**

In terms of the Skin, the “biological window” has different absorption percentages but is not dissimilar in terms of wave length. The maximum exposure values for Skin are much different compared to those tolerated by the Eye.

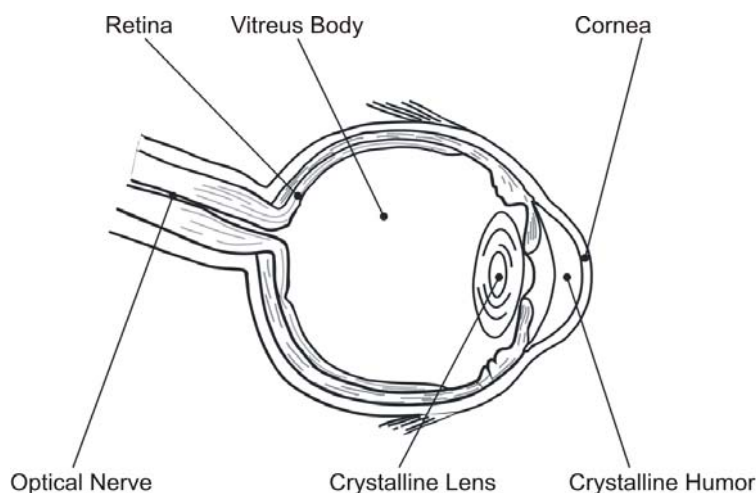


Figure 83: Eyeball section.

In terms of the damage mechanism that absorbed radiation can cause, it also depends on the wave length. Short lengths (ultraviolet: UV-C 180-280nm; UV-B 280-315 nm, UV-A 315-400 nm) generally cause photo-chemical effects:

- cataract, or opacification of the crystalline lens
- melanic coloring, or reddening of the skin

Greater wavelengths (infrared: IR-A 780-1400 nm; IR-B 1400 3000 nm; IR-C 3000-10^{E6} nm) generally cause thermal effects:

- detachment or photocoagulation of the retina
- burning of the skin

The degree of injury obviously depends on the **amount of absorbed radiation** and the **instantaneous power** of the radiation source.

CLASSIFICATION AND DANGER LEVEL

Regulations have established different classes of Laser danger based on the ability to injure people, from Laser class 1 (basically safe in all conditions) to Laser class 4 dangerous in various conditions.

Lasers which can produce risks, not only for direct or reflected radiation, but also for scattered radiation belong to class 4. These Laser sources can also have a significant risk for the Skin and fire risk for flammable material. For these reasons, the User must put into effect all measures aimed at containing the radiation to make sure that it is terminated at the end of its useful path. The operator must also be informed of the risks from exposure to Laser radiation and must wear specific I.P.D. (individual protection devices) including goggles that protect against radiation and are certified as suitable for this use.



NOTE:

The Ulyxe™ marker laser device contains a **class 4** invisible source.

APPENDIX D

RADIATION VIEWING CONDITIONS

The Laser output by the resonator is to be considered as a highly collimated and intense monochromatic light source. Due to these characteristics it can be seen as a “punctiform source” of high luminosity. This means that its image is then focalized on the Retina in a very small spot with a dangerously high power density! If the beam becomes divergent and scatters to a non-reflecting screen, then there is an “extended vision” of the image, with a decisively less dangerous power density. So there are different types of radiation viewing based on the access to the radiation and consequently different degrees of dangerousness.

DIRECT VIEWING OF THE LASER BEAM

This type of viewing is the most dangerous and can occur at the outlet of the laser aperture after having removed the lens. It is to be avoided at all costs! No protective goggles represent a valid means against direct viewing of the beam.

DIRECT VIEWING OF THE BEAM AFTER MIRROR REFLECTION

This may occur by directing the beam on a reflecting surface.

Viewing of a mirror reflected beam from a flat surface is very dangerous and equal to direct viewing.

DIRECT VIEWING OF THE BEAM OUTPUT BY AN OPTICAL FIBER

This happens if an Optical Fiber disconnects from the resonator. Viewing of the beam is dangerous up to a significant distance. Filters and Goggles do not ensure safety.

DIRECT VIEWING OF THE BEAM AFTER FOCUSING

This occurs if the Laser beam is not extinguished with an opportune absorber at the end of its useful path. Looking at the beam is dangerous up to a considerable distance. Filters and goggles can ensure safety for brief exposure, as long as they are the right size and certified.

SCATTERED VIEWING OF THE BEAM AFTER FOCUSING

This is the most frequent viewing, but opportune Filters and Goggles can ensure safety, even for prolonged exposure.

The Optical Risk Nominal Distance O.R.N.D. for Ulyxe™ laser is over 28,5 m, for direct or mirror reflected radiation and over 0,5 m for scattered radiation !

Only goggles with an Optical Density (O.D.) over 5 can momentarily protect the eyes against accidental viewing of damaging laser radiation!



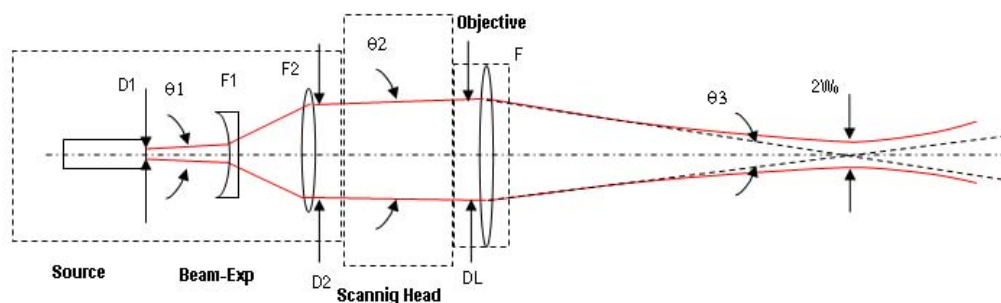
NOTE:

Always use goggles with conformity certificate.

Remember that **no goggles can provide prolonged protection from direct radiation!**

REAL DNRO DETERMINATION AND O.D. OF PROTECTION GOGGLES

In order to determinate the characteristics of the protection goggles, it is essential to determine the characteristics of the radiation, knowing its optical path, the dimensions of the beam and its divergence.



In particular, it is very important to know the diameter of the focal spot (which can be identified with beam waist $2W_0$) and the real divergence of the beam in output from the focalization lens. With all these optical data it is possible to do the calculations of the nominal distance of optical risk and of the optical density requested to the protection filters of the laser radiation.

Calculations have been done following the CEI EN 60825-1 (2007) Normative regarding nominal distance and optical risk in the worst condition and in case of accident exposition of 10s per direct radiation and 100s for diffused radiation.

ULYXE

Laser type	Nd:YVO ₄ : 1064 nm
Application type	Marking
Emission type	Pulsed (Q-Switched)
Observation type	Direct Radiation
Subtended angle of the source	$\alpha < \alpha_{\text{min}}$
Pulse energy	350 μJ
Pulse duration	20 ns
Repetition frequency	10 KHz
Beam diameter on the lens	2,5 mm
Beam divergence on the lens	1,5 mrad
Focal of the lens	160 mm
Real divergence after the lens	14 mrad
Exposition time	10 s
Diameter of the focal spot	165 μm

APPENDIX D

ACCIDENTAL CONDITION OF VISION OF THE DIRECT REFLECTED RADIATION

Distance > 0,5 m and for a maximum exposition period of 10s and supposing that there is a total reflection without attenuation.

DNRO = 28,5 m

OPTICAL DENSITY OF THE PROTECTION GOGGLES

Case a) Assuming to remove the fix protections and penetrate in the working area to adjust the process maintaining an observation distance Z of at least 0,5 m from the focal point and presupposing an accidental exposition of maximum 10s.

The protection goggles must have such an optical density to bear down the radiation under the maximum permitted value, precedently calculated, according to the here below reported calculation:

D.O.= 4,04 @ 1064 nm D.I.R.

Case b) Supposing to remove focusing head to do measurements on beam alignment, maintaining a Z observing distance at least to 0,66m from laser aperture, and supposing to use a reduction power of 50% and a total accidental reflection for a 10s maximum.

The protection goggles must have such an optical density to bear down the radiation under the maximum permitted value, precedently calculated, according to the here below reported calculation:

D.O.= 5,3 @ 1064 nm D.I.R.

SCALE INDEX OF THE PROTECTION GOGGLES FILTER

The scale index L of the filters indicates the stability to the radiation, that means the ability of the filter to maintain its characteristics unchanged. This stability is certified by the producer according to the EN 207 with tests conducted for 10s or 100 pulses.

It is then necessary to verify that the scale index of the adopted filter is stable for this period and foreseen an adequate over dimensioned in order to make sure that it could last longer than the accidental exposition period.

Case a) $H_{tl} = 62,6 \text{ J/m}^2$

Case b) $H_{tl} = 6760 \text{ J/m}^2$

To which it respectively corresponds a scale index (tab2 UNI EN 207) **L5** and **L7**.

To satisfy completely all prescriptions need to use a filter with optical density **OD>6** and scale index **L=7**.

EYES AND SKIN RISKS

If exposed to intense Laser radiation, even of a short duration, or a less intense but longer lasting duration, both the Cornea and the Retina can burn and be damaged irreparably forever. This consequence is completely realistic in the event of direct viewing of a class 4 Laser beam.

If subject to direct focalized radiation, even the skin can burn.

In addition, it is necessary to bear in mind that a collateral ultraviolet radiation may exist with the main radiation: long exposure may cause skin cancer.

GENERAL SAFETY REGULATIONS

The User must comply with the regulations and work in the best possible safety conditions to prevent decreasing the degree of machine safety. Therefore it is necessary to develop a Standard Operating Procedure (S.O.P.) related to maneuvers to effect for turning on and off the equipment. This procedure, which shall be prepared around the time of installation, shall serve as a reference for the Operator and shall be written in his/her language.

Training is essential and must include:

- Familiarization with system operating procedures.
- Knowledge of the biological effects of radiation on the Eyes and Skin.
- Understanding of the necessity for Individual Protection Devices (I.P.D.)

COLLATERAL RISKS

If the intended use of the source is changed, for example for material processing applications, collateral risks may arise represented by the production of fumes and vapors which may be irritating or toxic, if not removed and adequately filtered before being released into the air again.



NOTE:

It is advisable **not to change the intended use** without previously contacting the Manufacturer.

An additional risk may be represented by fire caused by processing materials other than those the equipment is designed for.



NOTE:

When processing **flammable material**, since there is a **fire danger**, it is indispensable to follow the instructions provided by the manufacturer when the machine is commissioned.



NOTE:

Do not subject **materials other** than those the equipment was designed for to radiation.

APPENDIX D

The most serious collateral risk associated with laser equipment, which may be fatal, is electricity. This may occur when the manufacturer's warning and procedures are not followed. Unauthorized and untrained personnel must never do any work on the electrical part. The safety devices must never be removed and their operation must be periodically checked.



NOTE:

Do not work on the electrical part if you are not trained to do so. **Do not remove protection devices.**



NOTE:

When processing **flammable material**, since there is a **fire danger**, it is indispensable to follow the instructions provided by the manufacturer when the machine is commissioned.

For example, during the intended use of the Laser source, if a material being processed undergoes alterations and produces irritating and/or toxic fumes, it may be necessary to remove the fumes from processing before releasing them into the air.

An additional risk may be represented by fire caused by processing materials other than those the equipment was designed for.



NOTE:

Do not subject **materials other** than those the equipment was designed for to radiation.



NOTE:

When processing **flammable material**, such as plastic, since there is a **fire danger**, it is indispensable to follow the instructions provided by the manufacturer when the machine is commissioned and follow the instructions in the **SAFETY** Appendix, in the **Collateral Risks** section.

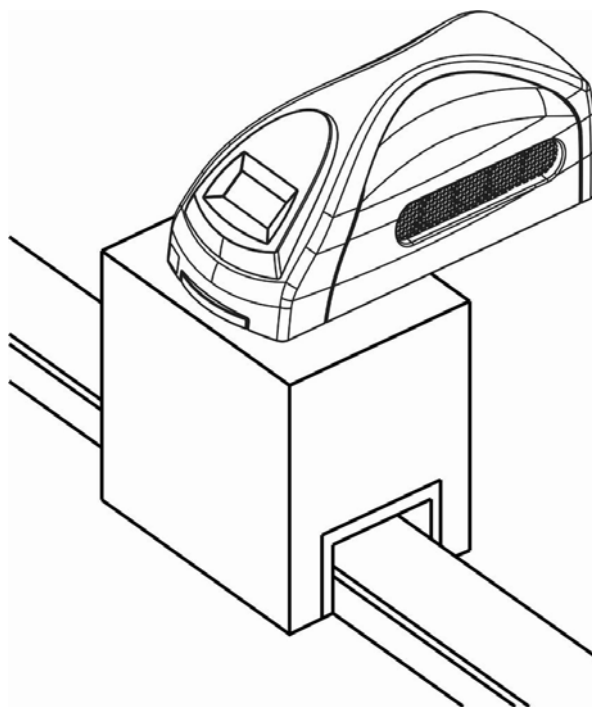


Figure 84: Safety mode example.

APPENDIX E: DECLARATION OF CONFORMITY**Datalogic Automation S.r.l.**

Via Lavino 265
40050 Monte San Pietro
Bologna - Italy
www.automation.datalogic.com

Laser Marking Business Unit

Via Le Gorrey 10 – 11020 Donnas (AO)
Via dell'Industria 20 – 21018 Sesto Calende (VA)

declares that the

ULYXE™ LASER MARKER

and all its models

are in conformity with the requirements of the European Council Directives listed below:

2004/108/EC EMC Directive
2006/95/EC Low Voltage Directive

This Declaration is based upon compliance of the products to the following standards:

EN 61000-6-2, AUGUST 2005 2007:

ELECTROMAGNETIC COMPATIBILITY (EMC)
PART 6-2: GENERIC STANDARDS –
IMMUNITY FOR INDUSTRIAL ENVIRONMENTS

EN 61000-6-4, JANUARY 2007:

ELECTROMAGNETIC COMPATIBILITY (EMC)
PART 6-4: GENERIC STANDARDS –
EMISSION STANDARD FOR INDUSTRIAL ENVIRONMENTS

EN 60950-1, JUNE 2006:

INFORMATION TECHNOLOGY EQUIPMENT - SAFETY
PART 1: GENERAL REQUIREMENTS

EN 60825-1, OCTOBER 2007:

SAFETY OF LASER PRODUCTS –
PART 1: EQUIPMENT CLASSIFICATION, REQUIREMENTS AND
USER'S GUIDE

Monte San Pietro, September 1st, 2011

Lorenzo Girotti
Product & Process Quality Manager



APPENDIX E

FIGURES

Figure 1: Overview Ulyxe™	v
Figure 2: Device Manager controller USB	vii
Figure 3: Ulyxe™ Overall dimensions	11
Figure 4: Seals position	13
Figure 5: Ulyxe™ Figure 6: Focusing Lens 160 mm	14
Figure 7: Power supply cable. Figure 8: USB cable. Figure 9: RS232 cable	14
Figure 10: Aux Interlock. Figure 11: USB key. Figure 12: Signal Key	14
Figure 13: Power supply and cables	15
Figure 14: Power supply overall dimensions	16
Figure 15: Control Box Basic	17
Figure 16: Control Box Basic	17
Figure 17: Control Box Basic overall dimensions	18
Figure 18: Control Box Evo	18
Figure 19: Control Box Evo	19
Figure 20: Control Box Evo overall dimensions	19
Figure 21: Focus lens	20
Figure 22: Suitcase	20
Figure 23: Heavy Duty suitcase	21
Figure 24: Focusing and aiming beams laser diodes	21
Figure 25: Prerequisites for installation	23
Figure 26: Ulyxe™ transport	24
Figure 27: Ulyxe™ fixing points	24
Figure 28: Measures, distance threaded holes and fixing pins drivers	25
Figure 29: Installation environment	25
Figure 30: Aux Interlock connector plug	26
Figure 31: Power Supply cable plug in	26
Figure 32: Main lead connector insertion	27
Figure 33: Plug-in signal key connector	27
Figure 34: Control Box Basic connection	28
Figure 35: Control Box Evo connection	28
Figure 36: USB pen drive insertion on PC	29
Figure 37: Start Wizard installation	29
Figure 38: License agreement	30
Figure 39: Installation destination folder	30
Figure 40: Installation type options	30
Figure 41: Not certified driver supplier warning from Microsoft® (Vista/7 and XP)	31
Figure 42: USB cable plug in request	31
Figure 43: USB cable to Ulyxe™ connection	31
Figure 44: USB cable to PC connection	31

FIGURES

Figure 45: New hardware found message window.	32
Figure 46: Automatic installation of the software.....	32
Figure 47: New hardware installation completed.	32
Figure 48: Installation completed.....	33
Figure 49: Firmware upgrade request.	33
Figure 50: Firmware upgrade procedure completed.	33
Figure 51: Disconnect USB cable message.....	34
Figure 52: Size of the marking field.....	35
Figure 53: Working Area.....	36
Figure 54: Scan head.	37
Figure 55: Field projection.	37
Figure 56: Example of external connections.	39
Figure 57: Possible external connections.....	40
Figure 58: Boxed power supply with main switch.....	43
Figure 59: Ulyxe™ main switch.	43
Figure 60: Green and red leds on back panel.	44
Figure 61: Starting system.....	44
Figure 62: Waiting for key start.....	44
Figure 63: Waiting for warm up.	45
Figure 64: System waiting enable command.	45
Figure 65: Led bar green: stand-by system status.....	45
Figure 66: Led bar orange: system ready for marking.	46
Figure 67: Yellow led indicator on back panel.....	46
Figure 68: Laser emission.	47
Figure 69: Red led bar: laser emission.....	47
Figure 70: Timing signals.	48
Figure 71: Cleaning laser output.	49
Figure 72: Female panel socket cod. UT0010-4SH (front view).	54
Figure 73: Male plug connector cod. UT0610-4PH (front view) and wiring.....	54
Figure 74: Female panel socket cod. 09-9766-30-04 (front view).....	55
Figure 75: Male plug connector cod. 09-9767-00-04 (front view).	55
Figure 76: Panel socket (front view) and internal interface.	56
Figure 77: Signal Key male connector.....	57
Figure 78: Display Ulyxe™.	58
Figure 79: Selection areas Touch Screen.	58
Figure 80: Display Touch screen menu.....	59
Figure 81: External labels location.	68
Figure 82: Internal labels location.....	68
Figure 83: Eyeball section.	73
Figure 84: Safety mode example.....	78



DATALOGIC AUTOMATION

Headquarters

Via Lavino, 265
40050 Monte San Pietro
Bologna - Italy
Tel. +39 051 6765611
Fax +39 051 6759324
Purchasing Dept. Fax +39 051 6765499
info.automation.it@datalogic.com

Laser Marking operation offices

Donnas

Reg. Gurey, via Le Gorrey, 10
11020 Donnas (AO) - ITALY
Tel. +39 0125 8128201
Fax +39 0125 8128401

Sesto Calende

Via dell'Industria, 20
21018 Sesto Calende (VA) - ITALY
Tel. +39 0331 9180601
Fax +39 0331 9180801